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**An Investigation into the Implementation of National Curriculum Design and
Technology in a State Secondary School**

A thesis submitted for the degree of PhD of the Open University

School of Education: Centre for Curriculum and Teaching Studies

Michael Ernest Harrison, MA, MEd, MSc

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Abstract of thesis

An Investigation into the Implementation of National Curriculum Design and Technology in a State Secondary School

The thesis deals with the process of curriculum change initiated by the British government's decision to include a national curriculum requirement in its Education Reform Act of 1988. The particular focus is on the development of the subject of Design and Technology, which was the only new subject in the national curriculum, and which, in the secondary phase, was required to be taught cooperatively by teachers of several existing subjects. The thesis demonstrates the need to combine two approaches to curriculum change in order to understand the process. The first is that typified by the work of Goodson, who maintains that subjects develop through the activities of disparate interest groups. The second is that typified by the work of Fullan, who maintains that change will only be successful if those involved are enabled to construct their own meaning for the change. Combining these two approaches *at school level* (which is a development of the approach of Goodson, who deals mostly at national level), demonstrates the complexity of the change process, and the need for a change strategy that handles this complexity.

In summary, the thesis is that the existence of many interest groups in the new area of design and technology in the national curriculum makes the processes of specifying the subject at national level, and implementing it at school level, difficult and controversial. For the processes of curriculum change to take place effectively, a strategy for change is required that recognizes the conditions within which teachers work, and the structures of organization and meaning that support their work. In the case of subject teachers in secondary schools, this means recognizing the influence of subject and departmental interest groups, as well as the influence of school organizational structures. Failure to apply such a strategy inhibits the change process and may result in outcomes that are less satisfactory than is desired.

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1 Introduction

The 1988 Education Reform Act set in place a legal and administrative framework within which various significant changes to the education system of England and Wales were made possible. One of the changes was the introduction of a national curriculum for all pupils between the ages of 5 and 16. Within this national curriculum there is one new school subject now required to be taught to all pupils: **Design and Technology (D&T)**¹. In the secondary phase, this subject is being implemented by teachers of a range of existing subjects who may in the past have taught something related to D&T as specified, but none of whom have taught it *as such*. The creation of a new school subject presents a valuable opportunity for research into the curriculum. In this case the unique conjunction of a new subject whose implementation was required by law set up the conditions for observing not only the **development of the subject** but also the **process of planned change**. The situation is of interest in two main areas of curriculum studies that I describe respectively as the **subject history** approach and the **change-process** approach. The former approach is typified by Goodson (e.g. 1987, 1988) who considers that social pressures operating through **interest groups** who advocate particular aspects of subjects for inclusion in the curriculum are of profound significance in shaping school subjects. Some of Goodson's ideas have recently been applied in the area of technology education by McCormick (e.g. 1992a, 1992b). The latter approach has many contributors: those of particular relevance to the situation investigated being Fullan (e.g. 1982, 1991) and Chin and Benne (1976). Fullan, drawing on the evidence of curriculum change writers of the last forty years, points to the need for people involved in the change process to be able to **construct meaning** for changes that are required of them, in order to respond effectively. Chin and Benne, writing generally about the implementation of planned change in social systems (of which the education system is one example), point to the need for, and

¹ For convenience I shall refer to D&T as a **subject** because it is timetabled, taught and assessed as such. Legally, it was established as one *profile component* within the national curriculum subject **Technology** (the other being **Information Technology**). This division of Technology is discussed in detail in Chapter 2.

variation in, **change strategies** on the part of those planning the change.

Much of the work of subject historians has focused on developments at national level. In the technology context, McCormick (1992a) has recently noted that:

there is little published research on what happens in schools as a result of curriculum change. There are few parallels of the curriculum histories represented in the work of Goodson (1983) and Moon (1986) at the level of the school to indicate whether the interactions of interest groups etc., are replicated at this level (McCormick, 1992a, p.27).

Fullan also points to the considerable body of evidence (Firestone and Corbett, 1987; Fullan, 1985; Clark, Lotto and Astuto, 1984; Huberman and Miles, 1984) that suggests that, in the process of educational change "the uniqueness of the individual setting is a critical factor" (Fullan, 1991, p.47). Although the work of curriculum historians has tended to focus at national level, Goodson himself recognized the need for work at school level in quoting Musgrove (1968) as follows:

Within a school and within a wider society subjects as communities of people, competing and collaborating with one another, defining and defending their boundaries, demanding allegiance from their members and conferring a sense of identity upon them ... even innovation which appears to be essentially intellectual in character can usefully be examined as the outcome of social interaction ...

studies of subjects in these terms have scarcely begun at least at school level (Musgrove, 1968, quoted in Goodson, 1987, p.5)

Such appeals suggest a pressing need to conduct research into the implementation of D&T through a case study that draws on relevant literature but focuses primarily on a particular research setting, in this case a school. A particular feature of this thesis is, therefore, that it seeks to apply the idea of subject formation by interest groups *at school level*. The relevant interest groups are identified initially at national level, and the national curriculum technology Order (DES/WO, 1990) is presented as an outcome of a process of debate and

compromise between these groups. However, the *process* of negotiation at national level is not discussed.²

The case study on which my thesis is based was carried out in a state-maintained local education authority (l.e.a.) comprehensive school between May 1989 and January 1993. This period covered the initial implementation of D&T as specified in the 1990 statutory Order for Technology (DES/WO, 1990). The requirements for establishing a schedule of visits to the school were driven largely by the timetable for national curriculum D&T implementation (see Table 1.1 below).

	-	
SEP 87	-	Jul 87 First general consultation document
	-	
	-	Apr 88 Technology Working Group formed
SEP 88	-	
	-	Dec 88 Working Group's Interim Report
	-	Jun 89 Secretaries of State's proposals to
	-	NCC based on Working Group's Final Report.
SEP 89	-	
	-	Nov 89 NCC proposals to Secretary of State
	-	Mar 90 Statutory Order for Technology
SEP 90	-	Implementation in Y7 (1st year secondary)
	-	
SEP 91	-	Implementation in Y7 & Y8
	-	
SEP 92	-	Implementation in Y7, Y8 & Y9

² The process whereby the statutory Order for technology came into being would be a complementary area of research, after the style of McCulloch, Jenkins and Layton's (1985) investigation into the development of the technology curriculum up to the mid 1980s. McCormick (1990a) draws attention to the closed nature of the process of drawing up the Order and Barnett (1992) alludes to the lobbying of interest groups. There are, as yet, no published studies of this process.

The proposals of the Secretaries of State (DES/WO, 1989) emerged in June 1989 and made it clear that "We propose to introduce the attainment targets and programmes of study ... in the first year of each of key stages³ 1, 2 and 3 in Autumn 1990" (DES/WO, 1989, para.9). This meant that a school receiving its intake of pupils at the beginning of KS3 would have to introduce the new curriculum for the Y7⁴ intake only in September 1990, and that 1991 and 1992 would see D&T progressively moving up the school with this cohort of pupils. Thus the proportion of timetabled periods allocated to D&T rather than its predecessors would increase annually between September 1990 and September 1994. This phased introduction strongly suggested that a longitudinal case study lasting about three years would be the most appropriate research method, and necessitated the negotiation of a form of contact with a school that would enable this long-term approach.⁵

Case study work has made a significant and useful contribution to educational research in general and curriculum research in particular over a period of some twenty years during the 1970s and 1980s. The pro's and con's of the genre have been debated (e.g. Walker, 1983; Kenny and Grotelueschen, 1984) and the debate will continue, but the uniqueness of schools as settings for change suggests that it is the most appropriate way to apply general principles to explaining the success or failure in a particular situation of a proposed change.⁶

Although the school is the discrete unit within which the implementation of change takes place, subject teaching is carried out in secondary schools in this country by individual teachers working in departments. Fullan (1982 - writing in a north American context)

3 Key stages 1 and 2 (KS1 and KS2) are primary education. Key Stage 3 (KS3) is the first three years of secondary education from ages 11+ to 14+. KS4 is the remaining two years of secondary education.

4 Key Stage 3 contains Years 7, 8 and 9, commonly abbreviated to Y7, Y8 and Y9. KS4 contains Y10 and Y11. 'Sixth Form' is Y12 and Y13. Throughout this thesis I shall adopt this convention.

5 Details of the fieldwork are given in the methodological appendix.

6 The particular value of the case study approach is discussed in the methodological appendix.

observes that:

In understanding and in coping with educational change it is essential to find out what is happening at the classroom, school and local levels of education as well as at regional and national levels. Neither level can be understood in isolation from the other (Fullan, 1982, p.12).

Fullan's note that the levels cannot be understood in isolation applies to the implementation of the national curriculum in the secondary phase in this country. It suggests the need here to attempt to understand a complex response to change involving interacting responses at the level of **school, department, subject⁷ and individual teacher.**

The changes required by the national curriculum were initiated at government level. Government (DES/WO, 1981) has itself argued that:

the quality of a pupil's education depends mainly on three factors: the quality of teaching, the resources available, and the curriculum. All three factors are connected (DES/WO, 1981, p.1).

The allocation of resources is, ultimately, the government's responsibility within a public service sector that has education as just one demand on available public finance. Various writers (Stenhouse, 1975; Hargreaves and Fullan, 1992) have argued that the other two factors - quality of teaching and curriculum - are profoundly linked. A key aspect of the quality of teaching is the interaction between a group of pupils and the teacher who is teaching them. A teacher brings to that interaction a unique approach that is the outcome of a complex range of influences including personality, life experience, personal education, and the process of becoming and being a subject teacher. Asking a teacher to change what is taught means taking into account all these factors that make the job of teaching possible.

⁷ The distinction between subject and department is necessary for two reasons. Firstly, a department (e.g. Humanities) may well teach a range of subjects (in this example perhaps History, Geography and Religious Studies). Secondly, whereas a department is a feature of school organization, a subject has a wider identity, as will be established in Chapter 2.

The thesis that I develop in the remaining chapters may be summarized as follows.

The existence of many interest groups in the new area of design and technology in the national curriculum makes the processes of specifying the subject at national level, and implementing it at school level, difficult and controversial. For the processes of curriculum change to take place effectively, a strategy for change is required that recognizes the conditions within which teachers work, and the structures of organization and meaning that support their work. In the case of subject teachers in secondary schools, this means recognizing the influence of subject and departmental interest groups, as well as the influence of school organizational structures. Failure to apply such a strategy inhibits the change process and may result in outcomes that are less satisfactory than is desired.

This thesis is predicated on a belief, supported by evidence from the case study, that a requirement to change the curriculum strikes in particular at the heart of the interaction between the individual teacher and a group of pupils. Therefore it is suggested that far more attention should be paid to acknowledging and addressing *within the change process* a teacher's ability to carry out this interaction. I have described this interaction as embedded in a set of influences at individual, departmental, subject, and school levels, so these influences need exploring. In the case of D&T in particular, there are important underlying questions about subject and departmental identity.

The approach that I have taken to understanding teachers' responses to the requirement to change what they are teaching has made use of fieldwork in the ethnographic style that has developed since the beginning of the 1970s and as summarized, for example, by Hargreaves and Woods (1984, pp.1-9). The intention is to understand how teachers themselves perceive their world and consequently construct meaning for the legally-imposed requirement to change what they are teaching. This is a social constructivist approach (after Berger and Luckmann, 1967) which is consistent with Goodson's view of how interest groups operate (which is in turn macro-political) and Fullan's view of how individuals respond (which is micro-political). The approach to analyzing the data obtained from fieldwork is therefore one on which the insights from the several areas of

research previously identified are brought together in a particular way to shed light on the complex process of change. This approach is consistent with that called for by, for example, Stenhouse (1975), who reflected on R.S. Peters' call for a 'mesh' of insights from disciplines in observing that "that mesh has not been achieved and *relevance to practice* depends on it. I see a possibility of its achievement through the close study of curriculum and teaching" (Stenhouse, 1975, p.vii, my italics). This quotation contains two implications. The first confirms the view that curriculum and teaching are profoundly intertwined in a way that suggests that attempts to change curriculum without acknowledging the nature of teaching are unlikely to succeed. The second is that the teaching practitioners who implement curriculum will only be practically helped by curriculum studies that understand this and make this understanding known.

The thesis is developed through six hypotheses which are grounded in relevant literature and tested against the available evidence relating to the development of the statutory Order for technology (DES/WO, 1990) and the evidence obtained locally in the case study school. The chapters develop the thesis in the following way. Chapter 2 considers the nature of school subjects and in particular looks at the formation of D&T at national level as a result of a debate between a range of interest groups within a schedule driven by statutory decree. Chapter 3 considers the nature of curriculum and the processes of curriculum change, and then looks in particular at the context of subject teaching in departments in schools that is the arena for curriculum change in this instance. Chapter 4 introduces the case study school, setting the scene in which the implementation of D&T was observed and subsequently analyzed. Chapters 5, 6 and 7 recount the process of D&T implementation in the school, using the insights from Chapters 2 and 3 to explain what was happening. The validity of the hypotheses is tested as is appropriate through the subject matter of each chapter. Chapter 8 reflects finally on the implications of the hypotheses, drawing some conclusions about the limitations of the change process in this instance and the nature of the emerging subject of D&T. From the latter some tentative conclusions are drawn that offer possible links with research into children's learning in D&T currently in progress (McCormick, Hennessy and Murphy, 1993).

2 School subjects and the case of technology

2.1 Introduction

Within the overall thesis, the purpose of this chapter is to develop an understanding of the nature of school subjects. Firstly, this provides a framework of understanding against which to evaluate the nature of D&T as initially implemented. Secondly, it provides a means of understanding part of the context within which subject teachers work, and from which they respond to change. The nature of school subjects is investigated by comparing and contrasting in particular the socio-historical perspective of such curriculum historians as Goodson (e.g. 1987, 1988) with the forms of knowledge perspective of such educational philosophers as Hirst (e.g. 1965, 1974). From this is drawn a view of subjects as socio-historical constructs, but also as having links with a range of human activities or forms of knowledge in the world, and as having various appropriate pedagogies.

One of Goodson's main ideas - that of the existence of diverse interest groups within subject communities - is explored with particular reference to the presence of technology in the curriculum before the arrival of the national curriculum. The purpose within the thesis is to show the range of interest groups in the area of technology education, and to indicate the range of views held about the nature of technology in the world and in the curriculum, and about its pedagogy, by these interest groups. The existence of a multiplicity of interest groups and views provides the starting point for the first hypothesis. The influence of such interest groups is then explored as it may have affected the specification for technology in the national curriculum: this exploration being done through the introduction of the second hypothesis. Attention is then drawn through the third hypothesis to the possibility of conflict between interest groups in the implementation of D&T at school level. The chapter ends by identifying some of the problems anticipated for implementation at school level: this leading into the Chapter 3 discussion of curriculum change.

2.2 Subjects

There are two reasons within my thesis that require the nature of school subjects to be clarified. The first is a desire to draw some conclusions about the nature of D&T as it has emerged to date (1993) under the terms of the 1990 statutory Order for technology (DES/WO, 1990). This is only sensibly attempted within a general framework of understanding about the nature of school subjects. The second is that D&T had to be implemented by teachers who were already teachers of an existing subject. Their own starting points for interpreting the new requirements were their understandings and rationales within these existing subjects. Therefore their response to a requirement to change was determined in part by the way *they* saw their existing subject, and the relationship of the new subject to this. It is central to my thesis that such construction of meaning by teachers is a significant feature of both the change process and the development of the new subject.

The national curriculum of England and Wales is organized on the basis of discrete subjects. The initial national curriculum consultation document published in July 1987 (DES/WO, 1987, p.6) named English, maths, science, a modern foreign language, technology, history, geography, art, music and physical education as the ten foundation subjects which (apart from the modern language) all pupils should study throughout their compulsory schooling. The same document also suggested that "there are a number of subjects or *themes* such as health education and use of information technology, which can be taught through other subjects" (DES/WO, 1987, p.88, my italics), and what emerged at a later time were five cross-curricular themes¹ to be taught in addition to the foundation subjects. Technology itself subsequently became unique within the national curriculum by being subdivided within its statutory Order (DES/WO, 1990) into two components: Design and Technology (D&T) and Information Technology (IT). In practice it is D&T that has

¹ Economic and industrial understanding, health education, careers education and guidance, education for citizenship, environmental education.

become the timetabled "subject"² that is the focus of this thesis - with IT being taught in a cross-curricular way. Such variations of description immediately raise the question as to what comprises a school subject. For example, why are science, technology and geography named as foundation *subjects* whereas environmental education is a *cross-curricular theme*?³ A functional answer that cannot lightly be dismissed is that a school subject is something that has a timetable slot in schools, characteristic content, methods and pedagogy, dedicated examinations or tests, and teachers trained and appointed to teach it. Unfortunately, this functional definition immediately runs into difficulties. For example, the *subject* of Environmental Studies⁴ existed before it was identified as a cross-curricular theme in national curriculum terms. Such variation of description suggests that there is something arbitrary about the nature of a school subject. However, within a thesis that seeks a clear understanding of one example of the way a subject develops within the process of curriculum change, the functional answer cannot be taken for granted and a wider framework of understanding must be sought, even though the sense of arbitrariness warns against unhelpful pedantry. Even if the functional answer *could* be accepted generally about school subjects, this presents a problem when it comes to technology, whose claim to existence as a curriculum subject was already the focus of considerable debate even as it was named for inclusion in the national curriculum (e.g. McCulloch, Jenkins and Layton, 1985; Open University, 1987a, 1987b).

The search for a framework of understanding of the nature of school subjects needs to pay attention to two contrasting approaches. The **socio-historical perspective** (typified by Goodson, e.g. 1987, 1988) looks at the overall development of subjects over a time period. The **forms of knowledge perspective** (typified by Hirst, e.g. 1965, 1974) attempts to identify features by which one form in which knowledge is held and used can be

2 The HMI report (DES/WO, 1992) on the first year of implementation of D&T confirms this and itself treats D&T as a subject.

3 In terms of the national curriculum, subjects are compulsory whereas themes are not, but that is an administrative distinction that contributes little to understanding the nature of subjects.

4 Goodson (1987, Ch.11) records the development of the subject.

distinguished from another. As will be shown, each of these perspectives can make useful contributions to a framework of understanding of the nature of school subjects, and the perspectives provide mutual criticisms that reveal that neither offers the whole truth. Within each perspective there are clues about three important aspects of school subjects: their **relationship** with activities in the world beyond school, which in turn informs aspects of their **content** and their **pedagogy**.

In this section, therefore, I consider first the insights into the nature of subjects from the socio-historical perspective and then those from the forms of knowledge perspective. Noting the interaction between these perspectives, I then consider how school subjects relate to the wider world. At the end of this section I consider briefly the case of science, both as a practical exemplar and as a reference for comparison with technology. In section 2.3 the case of technology as a school subject is considered in detail, using the insights from the preceding two sections.

The socio-historical perspective

Goodson (e.g. 1987, 1988) believes that each school subject is shaped by social factors as it enters and carves out a niche for itself in the curriculum. Two conclusions about school subjects which he believes to be substantiated by the work of curriculum historians are:

firstly, that subjects are not monolithic entities but shifting amalgamations of sub-groups and traditions ...

secondly, that in the process of establishing a school subject ... subject groups tend to move from promoting pedagogic and utilitarian traditions towards the academic tradition (Goodson, 1987, p.3).

The first of these he derives from the view of professions of Bucher and Strauss (1976, p.19) as "loose amalgamations of segments pursuing different objectives in different manner and more or less delicately held together under a common name at particular periods in history" (Goodson 1988, p.190). He concludes that "the subject community

should be seen as comprising a range of conflicting groups, segments or factions" (Goodson, 1988, p.190). Other writers refer to such groups as sub-cultures (Paechter, 1993) or **interest groups** (McCormick, 1992a, 1992b). The existence of such interest groups on the shaping of D&T at national, school and departmental level is a central part of my thesis which I shall develop in some detail. Curriculum historians tend to consider the effect of interest groups at national (or even international e.g. Moon, 1986) level. In this thesis I show that the outcome at national level (the statutory Order) of the process of developing D&T was subject to the influence of interest groups. However, unlike curriculum historians, I am interested in particular in showing how such interest groups significantly influence the implementation of a specified curriculum at school level. This will be a major feature of the case study in Chapters 4 to 7.

For the moment, I want to focus on the second of Goodson's conclusions that suggests how school subjects enter and develop in the curriculum. Embedded in this conclusion is Goodson's view of the three broad traditions about the nature and purpose of subjects in the school curriculum: the **academic**, the **utilitarian** and the **pedagogic**. The academic tradition focuses on content that is abstract and theoretical, with examinations intended to test pupils' knowledge and understanding within such a framework. Such subjects have high status and are often associated with university academic disciplines and entry to professional careers. The utilitarian tradition has lower status and focuses on practical knowledge that is considered appropriate for pupils entering non-professional vocations. For this reason, this tradition is often described as vocational, although Goodson prefers the term utilitarian because in his view academic subjects may reasonably be considered vocational for some pupils. The third tradition puts pedagogy at the centre, asking how a pupil learns as a central question in determining what ought to be included in that pupil's curriculum. Goodson's point is that subjects tend to move away from their original rationale for their inclusion in the curriculum for pedagogic or utilitarian reasons, towards academic and high status respectability. Goodson's view about this progression may usefully be illustrated generally by considering briefly as follows the historical development of school subjects.

Lawton (1973, Ch.5) presents a typical historical survey of the general origins of school subjects in this country. The grammar schools of the fourteenth and fifteenth centuries emulated the public school curriculum based on grammar and Latin and Greek because the subjects had **utility** in the world the students were to enter. Seventeenth century non-conformist academies introduced English, French, mathematics, science, history and geography, again for utilitarian reasons. Consequently, different utilitarian curricula for different groups of pupils co-existed. However, Lawton records that by the nineteenth century, the grammar and public schools were criticized for the *non-utility* of their curricula, even for the upper classes. What persisted through into the form of education under the 1944 Education Act were in practice different curricula for different children; the division being largely along the lines of social class. Within the tripartite system of the 1944 Act, grammar schools retained largely the curriculum that originated in the non-conformist academies mixed with some public school subjects, but which had now become **academic** and of utilitarian value primarily to those pupils destined for higher education and professional training. The technical and modern schools initially were intended to offer appropriately utilitarian curricula whose **pedagogies** were suited to pupils who found academic study inappropriate. Goodson (1987, pp. 30-34) notes how **subject communities** (a particular form of interest group) grew during the present century as a national external examination structure became established, teachers were trained to teach specialisms and schools grew in size resulting in a structure of subject departments (aspects of my previous functional definition of a school subject). In practice, and in very broad terms, the perceived high status of academic subjects has meant a tendency for the publically-examined academic subject curriculum to become the norm. With the move to comprehensive schools offering a subject curriculum leading to common GCSE⁵ examinations, subjects that tended to be in the utilitarian and pedagogic traditions have moved towards an academic format. One consequence of identifying a time line for

⁵ The General Certificate of Secondary Education examinations were first taken in 1988. Their syllabuses were developed under national criteria to replace those for separate General Certificate of Education and Certificate of Secondary Education examinations.

development of a given subject requires recognition that, at the point of naming subjects for the national curriculum, different subjects were at different points in their development. I shall consider in section 2.3 how such development had happened over a long period of time in areas contributing to technology teaching,⁶ and was still happening in the area of technology in the period leading up to the introduction of D&T. Given the tendency of subjects to develop towards the norm of an academic form, it is worth asking what comprises such an academic form. This question is appropriately addressed from the perspective that considers forms of knowledge.

The forms of knowledge perspective

In the 1960s and 1970s there was considerable philosophical debate about the nature of knowledge in relation to the nature of school subjects. Lawton (1973, Ch.2) rehearses the arguments of philosophers of education such as Hirst (e.g. 1965, 1974), Peters (e.g. Hirst and Peters, 1970) and Phenix (e.g. 1964) who sought an objective classification of *forms of knowledge*. Hirst's own definition of a form of knowledge is a "distinct way in which our experience becomes structured round the use of accepted public symbols" (Hirst, 1974, p.44). Each form has:

central concepts that are peculiar in character to the form ...

these ... form a network of possible relationships in which experience can be understood. As a result the form has a distinctive logical structure ...

the form ... has expressions or statements ... that in some way or other ... are testable against experience ...

the forms have developed particular techniques and skills for exploring experience and testing their distinctive expressions (Hirst, 1974, p.46).

⁶ Lord (1988), for example, traces the development of various craft traditions from the nineteenth century.

Lawton points out that the number and nature of forms of knowledge depends on the philosopher defining them: for example Hirst initially identified seven.⁷ Lawton and the philosophers of knowledge are at pains to point out that there is no *direct* link between such forms of knowledge and school subjects, although there is an argument that subject teaching is the most assured way of ensuring that pupils encounter the various forms of knowledge. Goodson has little time for such philosophical debates, feeling that:

this version of events simply celebrates a *fait accompli* in the evolution of a discipline and associated school subject. What is left unexplained are the stages of evolution towards this culminating pattern and the forces which push aspiring "academic" subjects to follow similar routes (Goodson, 1987, p.5).

However, he also points to the danger of the critique of the philosophical approach typified by Young (1971), by observing:

to view subjects as "no more than socio-historical constructs of a particular time" [Young, 1971, p.23], whilst correct at one level, does severe injustice to all those groups involved in their continuance and promotion over time (Goodson, 1987, p.5).

This recognizes the value and strength of subject communities in seeking to develop their particular area of knowledge. The danger of attempting to press the concept of forms of knowledge too far is recognized by their proponents. For example, Hirst's own definition requires structured public meaning and he notes that "all knowledge involves the use of symbols and the making of judgments in ways that cannot be expressed in words and can only be learnt in a tradition" (Hirst, 1974, p.45). So the attempt to distinguish objectively pure forms of knowledge, whilst useful in establishing, for example, the distinguishing features of science or maths, has implicit limitations. Interest groups have their own traditions that shape the formation and use of seemingly objective knowledge. Hirst also

⁷ Formal logic and mathematics; the physical sciences; our awareness and understanding of our own and other people's minds; moral judgement and awareness; aesthetic experience; religious; philosophical.

recognized that knowledge is organized and used in ways other than pure forms. For example:

there are those organizations [of knowledge] which ... are formed by building together round specific objects, or phenomena, or practical pursuits, knowledge that is characteristically rooted elsewhere ... These organizations ... are held together simply by their subject matter, drawing on all forms of knowledge that can contribute to them ... I see no reason why such organizations of knowledge, which I shall refer to as "fields", should not be endlessly constructed according to particular theoretical or practical interests (Hirst, 1974, p.46).

Hirst quotes geography as such a field of knowledge. Dodd (1978) represents technology as a field of knowledge, and I shall consider the appropriateness of this in Section 2.3.

The idea of forms of knowledge was taken up in a less rigorous sense when Her Majesty's Inspectors produced a consultation document *The curriculum from 5 to 16: Curriculum Matters 2* (DES, 1985a) that immediately preceded the national curriculum. The purpose here was to provide one possible "framework for use as a planning and analytical tool" (DES, 1985a, p.16) for ensuring a broad education for pupils. HMI's nine *areas of learning and experience* included the technological.⁸ It was stated that, whereas some school subjects would make a major contribution in one of these areas, the learning and experience associated with any one of them would not necessarily be confined to one timetabled subject. However, the areas were felt to be distinctive: "schools should ensure that ... each of the .. areas of learning and experience is represented sufficiently for it to make its unique contribution" (DES, 1985a, p.16). Another concept used in the attempt to understand the way knowledge is organized and used is that of the **domain**. This is typically defined as a "particular mental model we construct to interpret and represent the world which we label as science, humanities, etc." (Lawn, Moon and Murphy, 1990, p.57).

⁸ The others were aesthetic and creative, human and social, linguistic and literary, mathematical, moral, physical, scientific, spiritual.

This has clear links with forms of knowledge but tends to be used more in discussions of the way in which people learn than the way in which knowledge is organized *as such*. It is worth noting at this stage simply that there is no use of this term in national curriculum technology literature, although D&T is referred to as an area of learning and experience (DES/WO, 1988a, p.7).

In the secondary phase of education a subject-based curriculum is currently the norm. McCormick and James (1988, pp. 51-55) summarize the debate about alternatives of the late 1970s and 1980s, drawing particular attention to the case of the Munn Report in Scotland (Scottish Education Department, 1977) which, through a thorough investigation into the nature of knowledge and learning, found eight modes of activity.⁹ However, practical considerations relating to the organization of schools led to a proposal for a subject-based curriculum. In England, the primary curriculum has not recently been subject-based (although there are calls for it to become this), and there are arguments that favour an alternative approach. In the period in the 1960s and 1970s of considerable debate about the form of the curriculum, such professional groupings as the Schools Council (e.g. 1975a) and individuals such as Lawton (e.g. 1973) published views on the rationale for curriculum construction. The arguments represented there *against* subjects arise partly from a view that life's problems are not located and solved within neat subject categories and partly from a view that learning needs to start with a child's internal, complex, subjective view of the world, rather than with a neatly-structured external objective framework (Schools Council, 1975a, pp. 32-46; Lawton, 1973, Ch.4). The debate for or against subjects includes two important issues. One is a contrast between a "child-centred" and "subject-centred" approach to pedagogy, the other is the possibility or otherwise of the transfer of knowledge between one context and another. The point needs making that a "child-centred" view is not *as such* opposed to a "subject-centred" view, although the two perspectives do tend to become polarized in more polemical debate about

⁹ Linguistic and library study, mathematical studies, scientific study, social studies, creative and aesthetic studies, physical activity, religious studies, morality.

the nature of education.¹⁰ The case study in this thesis includes evidence that consideration of pupils' personal development was as important to many of the teachers as any initiation into a subject. This meant that the teachers held in tension the needs of their pupils and the demands of the subject: the nature of the subject thus being only one influence on their teaching. Even though such frameworks as areas of learning and experience offer ways of *analyzing* a curriculum which may not be structured around subjects, attempts to coordinate across subjects (for example even to indicate links at the level of specification of science and D&T in the national curriculum) have shown the severe practical limitations of such an exercise. Also there is evidence (e.g. McCormick, Hennessy and Murphy, 1993, p.2) that children compartmentalize knowledge in such a way that, for example, mathematical processes that are carried out in maths lessons are not transferred to the context of physics, and that knowledge obtained in one context needs reformulating if it is to be used in another (e.g. Layton, 1991). Given such practical and pedagogic difficulties with alternative approaches, it is not surprising that school subjects are dominant and each timetabled subject finds its own integrity and its own rationale for a place in the curriculum. In one sense, that brings the argument full circle to a possible conclusion that compartmentalized school subjects as functionally defined are just that and should look no farther than their own boundaries to justify their presence in the curriculum. However, that conclusion does not satisfy general questions about the nature of the curriculum in society that are raised in the next chapter, nor does it satisfy the necessary question about the relationship between individual subjects and the world beyond school. The relationship between school activities defined as D&T and activities that go on in the world will be considered in section 2.3.

How do the various school subjects relate to the world beyond school?

Each subject in the curriculum has its own history that reveals an interaction of a range of

¹⁰ A recent paper by McCormick (1993a) draws the perspectives together in the context of an apprenticeship model of learning.

interest groups. Whatever the formative mechanism, some current school subjects (such as physics) do have clear links with disciplines in the wider academic world; some (such as language and artistic work) are closely connected with various kinds of practical human activity; all have a level of utility that meets the needs of some pupils more than others. The government of 1981 did not think it too obvious to reiterate that "the curriculum needs to be related to what happens outside schools ... subject teachers should relate their subjects to the outside world" (DES/WO, 1981, p.18). This could be interpreted simply at the level of subject content. At the level of pedagogy it also becomes important: a point made strongly by Lawn, Moon and Murphy (1990, pp. 57-59) who maintain that crucial decisions about teaching and learning cannot be made without an understanding of the nature of what is being taught. Thus, if science and technology are activities in the world, the process of learning within them needs to understand not just the knowledge associated with them but how the activities are carried out in the world - a point made by McCormick (1993a). The evidence to be presented from the case study is that those teaching a particular subject look in part to the currently-perceived links that their subject shows with some activity in society in order to help justify and construct meaning for the work in which they are engaged. The pedagogic decisions made by teachers are influenced by their understanding of the potential for learning experiences offered by their subject in two areas. These are on the one hand the personal development of their pupils and on the other hand their pupils' introduction to the activity in the world. The detail of such issues and the impact on the change process and the nature of D&T is dealt with in the case study in Chapters 5 to 7.

Some school subjects are associated with particular forms or fields of knowledge however defined, and with associated academic disciplines or practical activities in the world. It may be that some connections provide greater status for teachers of some subjects than others, and that may affect the development of subjects towards the academic as well as teachers' perceptions of their own subject. What emerges in the case study as being of more importance within the curriculum change process is that a suggested change in the rationale for what is being taught (e.g. placing the "preparation of food" in a D&T rather

than a Home Economics context) removes, if only temporarily, this aspect of a teacher's confidence that what they are doing in the classroom is related to an activity in the world. A subject whose rationale is in the process of being changed presents problems of this kind to its teachers. This is an important issue in D&T, which (as I will show in section 2.3) has interest groups whose origins are in the utilitarian and pedagogic traditions, as well as its more recent academic advocates. Questions about the nature, utility and pedagogy of D&T are addressed in section 2.3, feature in the case study, and are considered in the final chapter. These questions are important both as they affect the change process and also in terms of the emerging nature of the subject.

What has emerged from the two perspectives on school subjects is a complex picture. Lawton noted that:

if we wish to be completely frank we would probably say that the typical curriculum is a mess - an uneasy compromise between traditions (of doubtful pedigree) and various pressures for change; a mixture of high-sounding aims and classroom practice which could not possibly attain the aims and sometimes flatly contradicts them (Lawton, 1975, p.7).

This is the context in which teachers carry out their work and (partly because of the perceived "mess") governments seek the implementation of change: issues that are addressed in subsequent chapters. The preceding discussion of the nature of school subjects has revealed the following points.

- The socio-political perspective has indicated that a wide range of interest groups exists whose influence helps to shape the nature of school subjects.
- The perspective also reveals that there are pressures that move school subjects away from pedagogic and utilitarian origins towards an academic format.
- School subjects do demonstrate links with activities in the wider world. In some cases these links may be with academic disciplines in higher education which may relate firmly to unique forms of knowledge, in other cases the links may be with practical human activities.

- Given these "external" perspectives on school subjects, subject teachers nevertheless deal very much with the givens of timetable slots and examination syllabuses and subject communities which give credence to their identity and work within a functional school subject.

Before turning to the case of technology as a school subject, I want briefly to illustrate these points about the nature of school subjects through the example of science which compares and contrasts interestingly with technology at national and school levels. Science has a much longer history as a school subject and could reasonably be represented as having moved well down the line of change from utilitarian/pedagogic to academic. Some of the issues current in technology have previously been faced in science, and some understandings of the development of technology in Upgrove School¹¹ were developed by those involved by making comparisons with science. Therefore there are general and specific reasons for setting out science as a basis for comparison.

Science as a school subject

Turner (1927, p.93) cites the Devonshire Commission of 1875 as revealing the reluctance of headmasters to allow science into an overcrowded curriculum: "Headmasters were inclined to look on science as having merely utilitarian value". Therefore, it was originally perceived as a utilitarian and low status by comparison with existing academic subjects. Now, however, it is one of the typically high-status academic curriculum subjects, with links with higher education, a particular form of knowledge, and used as an entry requirement for high-status careers. However, it is interesting to note the kind of reaction that its present academic nature provokes from one interest group seeking to restore utility to the curriculum who are "united in the need to transform the curriculum (especially the science curriculum) so that it consists far more of doing things than remembering them" (Layton, 1984, p.5).¹² This identifies the danger of a subject having gained academic

¹¹ This is the fictional name given to the school that is the subject of the case study.

¹² Layton is here quoting M.P. Christopher Price from the *Times Educational Supplement (TES)* of 16 September 1983.

respectability but being perceived by this interest group as having lost its utilitarian and pedagogic value for many pupils. Despite such concerns about its perceived bias, science as a school subject has identifiable links not just with an academic discipline and a form of knowledge but with an activity in the world. Some people's jobs bear the description "scientist", providing a firm basis for other interest groups to claim that the subject even as it stands does have utilitarian value.

Regarding the related form of knowledge, there is wide public recognition of a "scientific" way of doing things and view of the world. At another level, that view is also recognized and discussed by philosophers who find something unique in the "scientific" approach. In addressing the question *What is this thing called science?*, Chalmers (1982) drew on the debate of the 1960s and 1970s between such philosophers as Popper (e.g. 1968, 1969), Kuhn (e.g. 1970), Lakatos (e.g. 1974) and Feyerabend (e.g. 1975), showing divergence of opinion at this philosophical level. However, accepting the existence of this philosophical debate, it is possible to identify what may reasonably be described as a "scientific method" of hypothesis generation and testing which suggests a characteristic process to be represented in the corresponding school subject.

Science as perceived and practised in the world, therefore, does offer at one level the possibility of an integral whole from which activities and knowledge can be drawn to prescribe a science syllabus. In 1985 the government issued *Science 5-16: A statement of policy* (DES/WO, 1985a) which drew together information from a whole range of science-curriculum activities during the 1970s and 1980s that had informed the debate on science education. The conclusion (DES/WO, 1985, pp. 3-6) was that a combination of process and knowledge/understanding should be taught - the knowledge necessarily needing to be reviewed in the light of changing scientific knowledge in the world. The 1991 national curriculum Order for science (DES/WO, 1991) represents the present outcome of the process of selection: four Attainment Targets specifying a mixture of the processes and content of science. Therefore, a view about the nature of science in the world as comprising method and content has been exemplified in a curriculum specification. Within

that specification of what should be learnt as representing science, teachers then need to apply a *pedagogy* that is appropriate. In the case of science, that pedagogy currently draws on work from the Assessment of Performance Unit (APU)¹³ (published from 1981 onwards¹⁴), and the derived material within a constructivist paradigm (e.g. Driver, 1983).

Whilst this brief outline has presented the received version of science in the curriculum of this country, there is no suggestion that any aspect of it is beyond debate. Interest groups debate the merits of combined science versus separate science (e.g. Hargreaves, 1987), not least because there are identifiably different ways of proceeding in such divergent scientific areas as astrophysics and microbiology. The relative merits of the "process" and "content" aspects of science are also discussed. I have already indicated a debate about the perceived problems of an over-academic science lacking in practical application and perceived relevance. However, despite such variations of opinion between interest groups, science as a school subject has a degree of self-confidence about content, methods, pedagogy and its relationship with science in the world. It has a strong professional association (the Association for Science Education (ASE)) involved in teachers' professional development and in curriculum development, and its school departments tend to be clearly-defined and powerful. It has "A" level syllabuses with large numbers of candidates and direct links with university first degree courses and areas of research. All this adds up to a strong sense of subject community on the part of science teachers. Science as a school subject has a maturity that enables the pressures caused by differences of opinion between interest groups about many aspects of its nature to be contained within an overall identity. For example, although there are debates about combined versus separate sciences, there is none of the insecurity that faces D&T.

13 The Assessment of Performance Unit was set up in 1975 within the Department of Education and Science to promote the development of methods of assessing and monitoring the achievement of pupils in school. Its work in technology was initiated in 1980.

14 See DES/WO/DENI, 1989, for a full listing.

I shall now present evidence to suggest that technology as a curricular subject does not have that confidence and sense of subject identity. This suggests the possibility of problems not only in the specification of a subject at national level, but also that the teachers required to implement technology had greater levels of uncertainty than colleagues in many other subjects and, therefore, needed particular support when it came to implementing the national curriculum.

2.3 The case of Technology

From general considerations about the nature of school subjects, I now turn to the case of technology, introducing the first hypothesis within my thesis. The government's initial national curriculum consultation document (DES/WO, 1987) named **technology** as one of the ten subjects to be included in the curriculum of all pupils, giving it the same notional status as the other nine, and setting up at least the potential for a functionally-defined school subject to come into being. Whereas the other subjects had relatively long track records with large numbers of pupils, very few pupils were being taught a subject called technology. There was certainly some technology being taught to some pupils within some subjects in some schools in England and Wales in the mid 1980s, but most children's experience of technology was small compared with their experience of science.¹⁵

Historical accounts of this area of the curriculum in England and Wales (e.g. Dodd, 1978; McCulloch, Jenkins and Layton, 1985; Penfold, 1988; Toft, 1989) reveal the existence of a wide range of interest groups, suggesting that Goodson's ideas will have particular relevance. McCormick's (1992b)¹⁶ analysis of such interest groups reveals firstly that they range from those predominantly of subject teachers to those drawn from a much wider constituency that wield significant political pressure, and secondly that the interested

15 The most overt labelling of a subject as technology was within the General Certificate of Secondary Education (GCSE) examination syllabus known as CDT: Technology.

16 This is the most readily-available detailed version of an earlier conference paper (McCormick, 1990b) which is also available in shortened form (McCormick, 1993b).

subject areas range from art and craft to science and engineering. An important feature of McCormick's analysis is that he draws attention to the fact that different interest groups tend to promote different **aspects of technology** (i.e. different selections from the technological area of learning and experience), linked to different **reasons** for wanting to see these in the curriculum. These will become apparent as technology is explored. Of particular note in the context of Goodson's ideas, is that whereas there are signs of overall progression within technology from utilitarian/pedagogic origins towards an academic form, technology is shown to have *current* active advocates in academic, utilitarian and pedagogic traditions, which makes for a considerable confusion of views.

The first hypothesis within my thesis is that, in three significant areas of understanding of its nature, technology education suffers from a lack of agreement between interest groups. The areas are i) the nature of technology in the world, ii) the nature of technology in the curriculum, iii) the nature of an appropriate pedagogy.

In this section I shall examine this hypothesis with regard to interest groups operating at national level (its application at school and departmental level will be examined in the case study in Chapters 5 to 7). I shall first consider **technical** education as one particular context in which aspects of technology were developed. I shall then show how two broad interest groups - one advocating **design** and the other advocating **technology** - have influenced the development of various existing school subjects in the period roughly defined as between the 1944 and 1988 Education Acts - drawing on and developing the work of McCormick (1992b). I shall then consider the nature of relevant **existing subjects** as being potential contributors to (and therefore providing interest groups in) the prescription and implementation of national curriculum technology. I shall draw on commentaries from the mid 1980s to show the concerns that existed in the three areas of definition (technology in the world, in the curriculum, and its appropriate pedagogy). An issue to be borne in mind is the way in which the ideologies of interest groups interact with the practicalities of the subject curriculum. The deeply-held views of some interest groups, arising from a particular ideology and generating polemical debate, frequently result in

outcomes that may exhibit less influence than the group hoped to achieve.

Technical education

An important feature of the context for technology education in England and Wales is a continuing debate about the role of vocational education¹⁷ and its relationship with general education. The tripartite division into secondary grammar, technical and modern schools set up under the 1944 Act envisaged separate schools and curricula appropriate to certain kinds of pupil. The grammar schools inherited the academic subjects, the technical schools were to provide a more practical approach, and the modern schools were to provide general non-academic education, each having appropriate pedagogies. In practice, many schools functioned as grammar-technical, because the technical partner was undeveloped. Even within grammar-technical schools, the technical side was often underdeveloped. The development of technical education is traced typically by Musgrave (1970a, 1970b) and McCulloch (1992) from the second half of the nineteenth century. Musgrave quotes an article from *The Economist* of 25th January 1868 (pp. 87-88) as stating that "the notion of technical education" was "almost entirely new to this country". Musgrave goes on:

The Economist thought that there was a need to arrive at some definite conclusion as to the form technical education should assume in Britain, but was adamant that the workshops and offices of the country were 'its true technical schools' (Musgrave, 1970a, p.65).

Thus two issues are apparent: a lack of an appropriate definition of technical education (typical of the whole area of technology education) and a view that schools themselves were not an appropriate place for technical education. He goes on to identify two emphases from different interest groups which have remained apparent throughout the development of technical education: on the one hand that it should be about *general principles* and on the other hand that it should be about *particular practice*. It is a debate

¹⁷ I shall not distinguish between vocational and pre-vocational education in this context.

that echoes still in discussions of technology education. Musgrave also identifies the problem of status existing from the very beginnings of technical education, because of its association with industry which was itself held in low regard. He quotes an observation from Ruskin in 1862 on the low esteem in which industry and those running it were held:

the tact, foresight, decision, and other mental powers, required for the successful management of a large mercantile concern, if not such as could be compared with those of a great lawyer, general, or divine, would at least match the general conditions of mind required in the subordinate officers of a ship, or of a regiment, or in the curacy of a country parish (Musgrave, 1970b, p.153).

Technical education within the 1944 Act continued to suffer from low status, but it was the main context in which what its proponents called an "alternative road" into academic subjects developed. This thread of development of technical education can be traced from the *Crowther Report* of 1959 through to the present (Layton, 1984; McCulloch, 1992), and it represents an interest group with views about both technology and science education. In terms of its view of technology, this "alternative road" group tends to advocate those aspects of technology associated with applied science knowledge and the development of practical skills that are vocationally linked with industrial and engineering careers. Their motivation comes in part from a sense of the need for technology education as serving the nation's economic needs, but there is also the sense of an alternative pedagogy which, while seeking to develop practical skills also seeks to develop "know-how", as opposed to the academic "know-that". As such, this approach seeks an alternative to the academic approach to learning (particularly in science) which it criticizes, as previously noted (p.21). As McCulloch, Jenkins and Layton (1985) note, the perceived low status of technical education inhibited the development of appropriate curricula on any more than a small scale by comparison with academic subjects. However, the approach that seeks to develop practical ability, or capability, has persisted. A powerful political interest group -

the *Education for Capability* movement supported by the Royal Society of Arts¹⁸ - became influential in the 1980s. This group "accepted that a traditional academic curriculum is not necessarily the best way of preparing young people to become capable, independent individuals" (Black and Harrison, 1985, p.2). This approach is akin to that of the "alternative road". It marks the point of view of an important interest group who were politicking in the period preceding the announcement of intentions for the national curriculum. The public manifesto published by the Royal Society of Arts in the national press in 1980 sought to identify the rift between 'education' and 'training', stating that

A well-balanced education should, of course, embrace analysis and the acquisition of knowledge. But it must also include the exercise of creative skills, the competence to undertake and complete tasks and the ability to cope with everyday life ... There exists in its own right a culture which is concerned with doing, making and organizing and the creative arts. This culture emphasizes the day to day management of affairs, the formulation and solution of problems and the design, manufacture and marketing of goods and services. Educators should spend more time preparing people in this way for life outside the education system. The country would benefit significantly in economic terms from ... Education for Capability (RSA, 1980).

The Technical and Vocational Education Initiative (TVEI)¹⁹ (McCulloch, 1992; Dale *et al*, 1990), initiated in 1982, supported the development of syllabuses and workschemes along the lines of capability, and had had some influence on curricula by the time the national curriculum was proposed. The development of the concept of capability is an important one in terms of national curriculum technology, and will be dealt with in more detail later in this section.

18 The Royal Society for the encouragement of Arts, Manufactures and Commerce began its promotion of *Education for Capability* in 1979.

19 TVEI is mentioned here within the context of technical education. The *mechanism* of its introduction was controversial because it bypassed much of the existing system. This feature of TVEI will be discussed further in Chapter 3.

Summarized as an interest group, with the necessary rider that this is a simplification of the situation, the views about technology are as follows.

- View of technology in the world: the industrial application of science which is the central driving force in a developed economy.
- View of technology in the curriculum: the knowledge, understanding and skills derived from the above, but selected because of the constraints of school facilities.
- Pedagogy: learning through practical applications and experience - the development of "know how" as much as "know that".

Having considered one important context within which a group having an interest in technology education is located, I turn now to two general but significant interest groups - those advocating separately design and technology - that made persistent attempts to obtain a place in the curriculum for their favoured subject. After a necessary clarification of the way words are being used, I turn to a discussion of the nature of these two interest groups and their views.

A problem of description

So far in this section I have used the word "technology" in the way that many writers on the subject do: as *including design*. However, the exploration of interest groups cannot proceed without some attempt to clarify the relationship between technology and design, because the two have become so closely linked. At the broadest level of analysis there are large and heterogeneous interest groups advocating the inclusion of **design** on the one hand and **technology** on the other hand in their own right in the curriculum. What clouds the issue is that some advocating design will include technology within their understanding of design (e.g. Archer, 1979), and some advocating technology will include design (e.g. Black and Harrison, 1985). In both cases, the inclusion is often implicit. The difficulty of clear definition begins with attempts to define technology and design as activities in the world, and is compounded by those who incline to enlarge their case for including either

of them in the curriculum by making one include the other. Before dealing with the interest groups, therefore, it is necessary to lay down some ground rules for the way the words are going to be used in this thesis. My chosen way of conceptualizing the relationship is shown in Figure 2.1 below.

This representation has been used in Open University in-service courses (O.U. 1987c, 1992, 1993) and has proved appropriate as a means of discussing the relationship. It allows design and technology to have separate identities, whilst recognizing a considerable common area. However, it means that some technology activity is acknowledged as not design and some design activity is acknowledged as not technology. It does not claim that either completely contains the other.

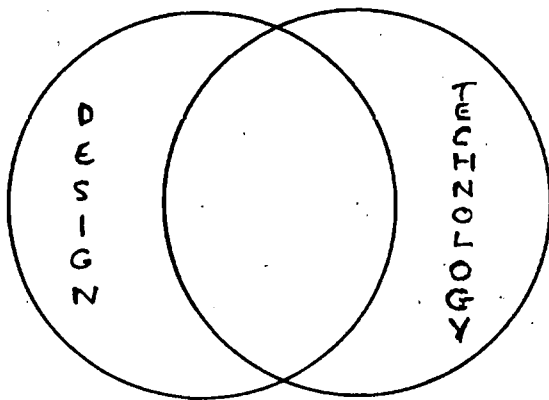


Figure 2.1 The relationship between design and technology

In the remainder of this thesis I shall use the word *technology* in the general sense to *include* relevant aspects of design. Some documents prefer exclusive usage which then leads in effect to a compound noun "design-and-technology" to describe the inclusive activity. This latter form became the practice in APU documents (1981, 1987, 1991) and was rapidly adopted within the national curriculum. Whilst national curriculum D&T (the focus of this thesis) may be coming to represent something in terms of a school subject, it raises the question as to whether or not this can be any more than a functionally-defined subject. Technology and design can separately be found to relate to activities in the world: there being designers and technologists. The job description "design and technologist" (or even "design technologist") is not one that is in common parlance. This issue is one aspect of the nature of D&T as a school subject on which I shall reflect in the final chapter. Having set up the ground rules for the use of the words, I now turn to a detailed consideration of the separate design and technology interest groups.

Design

The development of design in the curriculum is recorded in several accounts (e.g. Eggleston, 1976; Dodd, 1978, Ch.III; Penfold, 1988, Ch.4, McCormick, 1992b, pp. 22-23). Here I give a brief overview of the range of interest groups and draw out and develop points of most relevance to my thesis. McCormick (1992b) traces the origins of design in association with art in this country. Drawing on Thistlewood (1989), he shows how two contrasting interest groups were influential in the nineteenth century:

One, the Society of Art Masters (SAM) was a hierarchical, subject-centred association of art school (male) principals dedicated to presenting drawing as an academic discipline, emphasizing classical draughtsmanship and design allied to industrial arts. The other, the Art Teachers Guild (ATG), contrasted strongly with SAM. Mainly made up of female classroom teachers, it was egalitarian, individual-centred (child-centred) in its interests. Its outlook was to support those who considered the creativity, expression, invention and imagination of childhood as important (McCormick, 1992b, pp. 22-23).

It was as recently as 1984 that the successors of these organizations (representing academic and pedagogic traditions) joined to form the National Society for Education in Art and Design (NSEAD) which attempts to encompass the two approaches. Design, therefore, finds links with art in the curriculum.

In the early 1960s, boys' craft studies in the utilitarian tradition consisted of the three skills-based subjects of woodwork, metalwork and technical drawing.²⁰ Against this background, the Schools Council²¹ established a *Design and Craft* project with the intention of broadening such craft work from a series of set pieces to be manufactured, to include some opportunity for designing of their own work for the pupils. Penfold (1988, pp. 121-122) records how what became known as the *Keele Project*, led by John Eggleston, grew out of this Schools Council project at a time when teachers of boys' crafts were having to cope with extra numbers of boys staying on to do these subjects after the raising of the school leaving age from 15 to 16 in 1965. Therefore, design finds links with craft in the curriculum. As in the case of art, the approaches and rationales of craft teachers vary, and the linking of craft with design brings separate interest groups into interaction.

Pressure for design *as such* (i.e. not just as linked with art or as a way of enhancing craft) to be included in the curriculum came subsequently from professional designers (through the Council of Industrial Design, now the Design Council) and from various individuals in Higher Education (such as Bruce Archer and Ken Baynes). Based at the Royal College of Art (RCA), Archer headed an inquiry into design in schools (RCA, 1979). Archer's own view (Archer, 1979) was that design represented a third major area in education complementing science and the humanities. McCormick notes that, for Archer:

Design concerns doing and making, and it includes technology and the fine, performing and useful arts ... he represents technology as lying somewhere

²⁰ The origins of these subjects are considered in the later section on CDT.

²¹ The Schools Council (for the curriculum and examinations) played a significant part in curriculum development projects between 1964 and 1984. Its approach will be further explored in Chapter 3.

between science and design (McCormick, 1992b, p.23).

Here, then, is a typical view of technology from the design interest group: a view that inevitably clashes with the alternative view that it is technology that includes design. Another important point is made by McCormick (1987, pp. 12-16) who presents evidence that some advocates of design education believe that, for example, a syllabus that specifies anything other than *process* is not a genuine design syllabus. For example, the National Association for Design Education (NADE) offered advice on choosing a GCSE course in design, from which the following extract is taken.

The essence of a design course (no matter what subject comes under its aegis) must be the experience of the activity of designing itself ... If the questions are not all problem-based design questions it is not really a design examination (NADE, 1986, pp. 43, 46).

This focus on the process at the expense of content can be linked into the argument of those who favour a "child-centred" approach, because of a perceived flexibility in enabling the child to learn through solving problems. However, the existence of such general problem-solving ability is under close scrutiny from research (Hennessy, McCormick and Murphy, 1993) which brings evidence that problem-solving is highly dependent on the context and the particular problem being solved. This research also suggests that a pedagogy for problem-solving or for the processes of design is far from well understood (McCormick, Hennessy and Murphy, 1993). However, in the wider world of design there is a developing body of knowledge about the processes of design as carried out by professionals which Cross (in Cross, Kees and Roozenburg, 1992) traces back to the work of Marples in 1960. Such empirical work (in the professional design and educational areas) takes time to influence curricula and pedagogies, and debate about the contribution of design to the curriculum in the meantime tends sometimes to the polemical.²²

²² See McCormick (1993a) for an attempt to develop a theoretical view of the link between professional practice and pedagogy.

The above debate about the design process touches on the relationship between the *process* of designing and the *knowledge* used during designing. A similar issue is that of the relative merits of pupils learning to *design*, as opposed to acquiring *making skills*. Debate of both issues carried forwards into the specification and implementation of D&T, and featured in the development of D&T in Upgrove School. There is a not untypical and relatively functional view that tends to identify "technology" with content, and "design" with process. For example, in attempting to find some kind of basis for assessment in design and technology, the APU suggested in an early consultative document that:

whereas all types of design activity share [the need for skills, knowledge and values to be applied] ... it is when the knowledge component is analyzed in detail that the activity assumes a greater or lesser technological significance (APU, 1981, p.7).

Therefore, they were prepared to agree with the possibility of a general process, leaving the content to determine whether or not the design was to be considered as technological. Whereas this attempts to establish a criterion for design being technological, it fails to address the more profound criticisms of the generalisability of problem solving in design. However, the design-as-process and technology-as-content view is held by sufficient numbers to comprise a significant interest group.

The other issue - the relative merits of teaching design or skills - is still capable of commanding polemic at national level. Under a headline *How Britain turns out woodwork dunces* the *Daily Telegraph* of 22nd March 1993, reporting a survey by the National Institute of Economic and Social Research, observes that:

instead of teaching basic skills, schools were emphasizing imagination and grandiose design, with the result that pupils' work fell far short of standards on the Continent and failed to prepare them for vocational training (*Daily Telegraph*, 22-3-93, p.1).

It is clear that underlying this comment is a view that skills are necessary for the vocational training that will prepare a workforce and hence improve the economy: an

important feature of the debate between interest groups supporting vocational and general education within which arguments for design and technology in the curriculum take place.²³

Against this background of widely-differing views about design and its relationship with technology, design had found several homes in the secondary curriculum by the mid 1980s. In some l.e.a's it linked with art in school departments of art and design. In other l.e.a's a design faculty had come to encompass subjects including art, CDT and Home Economics. It had become one constituent of the triumvirate subject Craft, Design and Technology (CDT) which had developed out of the original boys' craft subjects. It represented an approach to working within Home Economics (HE), especially within textiles. It also had its own A-level syllabus.

What has emerged from this brief discussion of the design interest group is that it represents a lobby that had campaigned actively and with some success for the inclusion of design in the curriculum: either in its own right or within other subjects. Broadly-represented, its views are as follows:

- View of technology in the world: possibly as a context in which design takes place (industrial design) - good design being the essence of industrial success. Alternatively seeing technology as a part of design - design being the overall process that makes use of technological knowledge.
- View of technology in the curriculum: areas of knowledge content that are applied in the course of the design process.
- Pedagogy: experience of the design process, which is presented either as a form of problem-solving or as a series of stages. Links with the development of creativity and personal development of pupils.

²³ It is also true that the design interest group has called upon the economic argument: suggesting that the essence of economic success lies in products that are well-designed.

Technology

It is possible to trace a growing movement from the mid 1960s that took a lead from Harold Wilson's reference to the "white heat of technology", and the establishment in 1964 of the Ministry of Technology with Tony Benn at the helm, in demanding technology in the curriculum. The nature of the complexity of curriculum initiatives even in the early days of technology in the curriculum is illustrated by Figure 2.2 below which shows a brave attempt from 1973 to chart just ten years of its development.

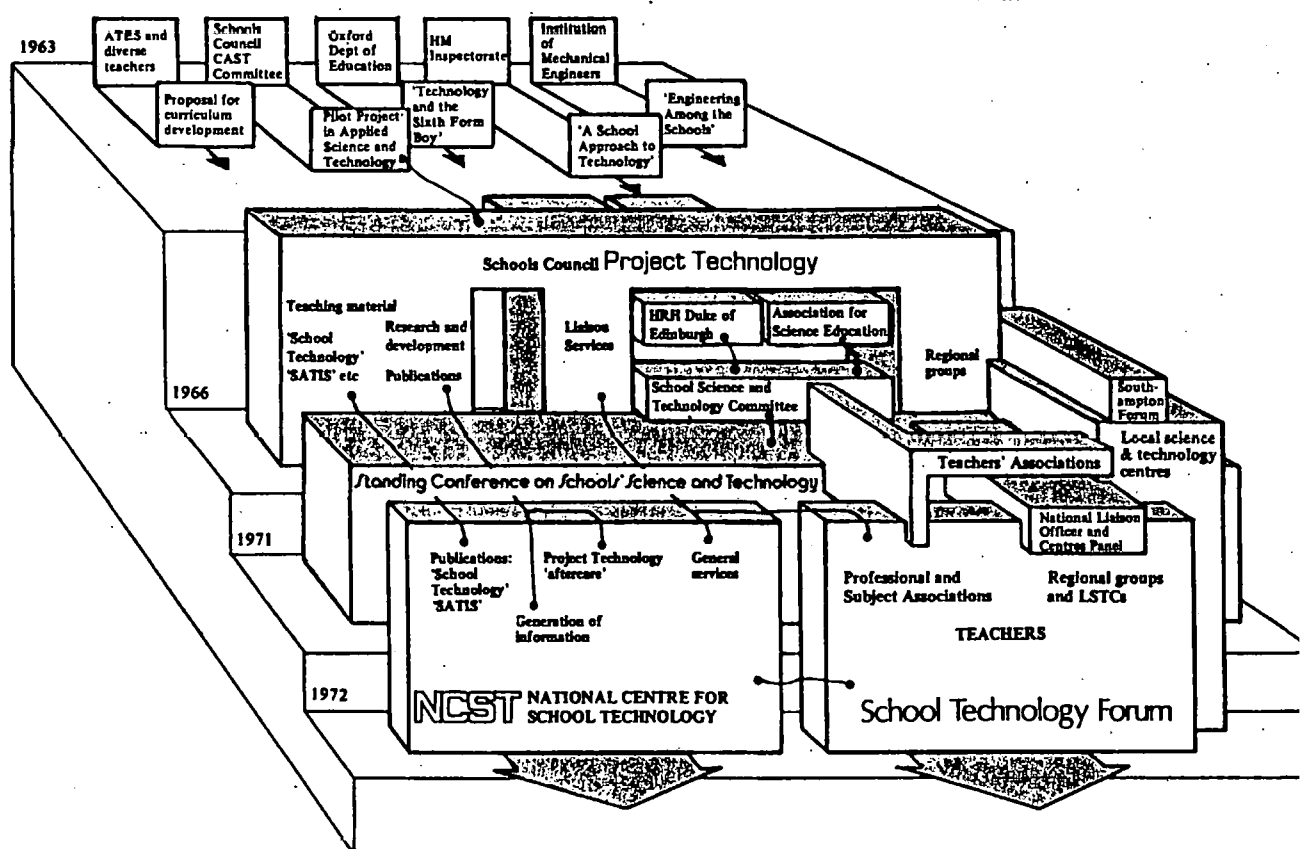


Figure 2.2 The early emergence of technology in the curriculum (from School Technology Forum, Working Paper 1 (1973) p.10).

The Schools Council was again involved, being "invited to consider sponsoring a development project in the field of applied, or engineering science" (Schools Council, 1965, p.16). This was in addition to the project that spawned the *Keele Project* in the craft and design area. The report on the pilot study for the applied science project stated that:

The aim [of the pilot year] is to get clear what needs to be done to enable schools in general, if they wish, to modify their science teaching in the direction of applied and engineering work (Schools Council, 1966, p.2).

Thus it is clear that this project was aimed at science teachers (in the academic tradition), as opposed to boys' craft teachers (in the utilitarian tradition). The pilot study led to the Schools Council's funding of *Project Technology* which was established in 1967 "to develop teaching materials for use in schools and to stimulate outside support for the technological work of schools" (Schools Council, 1973a, p.63). In terms of teaching materials, the main output of *Project Technology* was the *Control Technology* course package (e.g. Schools Council, 1975b) for Y9 to Y11 which focused on project work based on mechanisms, structures, electronics and pneumatics and found some support within examination boards who provided syllabuses. This course therefore selected knowledge and skills to be taught, but with a developing emphasis on pupil-directed project work. There was also some associated reflection on the nature of technology, exemplified by the School Technology Forum *Working Paper 1* (SCSST, 1973) and the subsequent booklet *Living with Technology* (SCSST, 1974). Such publications indicate an awareness of the social context and broad subject base for technological activity in the world, even if these features of technology did not at the time find their way into school courses.

A later technology project whose outcome led to the production of a series of publications that became very popular with *craft* teachers (whereas *Control Technology* found its way more into science departments) became known as *Modular Technology*. This project built on work carried out initially in Hertfordshire and Avon between 1970 and 1974 when a series of books (e.g. Schools Council Publications, 1981) was launched between 1980 and

1982 to help schools introduce technology either as a single subject, or to enrich their existing courses. The *Modular Technology* course (in the areas of mechanisms, structures, etc.) tended to feature in CDT departments. Again, there was a selection of subject material and skills to be learnt, and the problem-solving approach was actually dealt with in a separate book that complemented the content material.²⁴

Some of the ideas being advocated from this interest group were quite broad in terms of an understanding of the nature of technology in the world, although the evidence of the curricular inclusions was that the content of the courses focused on engineering applications of physics. An alternative view of the place of technology in the science curriculum came through interest in teaching pupils about controversial issues, and this will be taken up later in the section when science is discussed as a subject group having an interest in technology.

Views within the technology interest group are summarized as follows:

- View of technology in the world: a significant human activity in the world, involving and affecting large numbers of people. Tendency to think in terms of engineering applications of science, although recognizing the social context in which engineering is carried out.
- View of technology in the curriculum: areas of knowledge drawn from engineering, located either in the science or the craft area.
- Pedagogy: very often using individual pupil project work as a means of developing knowledge and understanding, as well as experience of problem solving.

Having considered the views within, and influence of, these two broad interest groups, I now turn to the school subjects in which aspects of technology were represented in the mid

²⁴ Content areas listed are Energy Resources, Electronics, Mechanisms, Structures, Materials Technology, Pneumatics, Instrumentation.

1980s, and which therefore comprised subject community interest groups in their own right in the debate about the nature of technology in the national curriculum. In each case, it is possible to identify general views associated with these subject communities, although it will also emerge that there was considerable local variation between I.e.a's and schools. On the one hand this re-emphasizes the difference between public statements made by interest groups and the practical outworking of their views, and on the other hand it signals the importance of paying attention to local circumstances when interpreting and planning for curriculum change - the rationale for the focus of this thesis. The subjects considered are Craft, Design and Technology; Home Economics; Art and Design; Business Studies; Science.

Craft, Design and Technology

The most significant consequence of the activities of the various interest groups promoting both design and technology from the 1960s and into the 1980s was the emergence of the triumvirate "subject" of CDT. Penfold (1988) locates the rise in this subject in the period 1973-1986, although he points out that "the *Education Year Book 1983* revealed as bewildering a range of names [for examination courses] as in 1883" (Penfold, 1988, p.23). By the time national curriculum D&T was mooted, CDT had a functional identity as a school subject - i.e. it had timetable slots, departments in schools, teachers who called themselves by that name, colleges that trained teachers to teach it, advisors and HMI's allocated to it, and - final confirmation - a section in the job pages of the *Times Educational Supplement (TES)* labelled CDT. In 1980, HMI had published *Craft, Design and Technology in Schools: some successful examples* (DES, 1980), and *Curriculum Matters 9* (DES, 1987) focused on *Craft, design and technology from 5 to 16*. However, CDT departments in schools contained colleagues from earlier woodwork, metalwork and technical drawing traditions and interest groups who were somewhat thrust together. The familiar craft subjects had been joined by the relatively recent curriculum inclusions of design and technology. Although Lord (1988) has shown how the craft tradition itself encompasses a range of interest groups tracing origins back to the nineteenth century, the

tradition in boys' craft subjects had become very much that of set pieces of work to be carried out sequentially in order to develop a range of practical skills. Many teachers of CDT even in the mid 1980s had been trained to teach either woodwork, or metalwork, possibly along with technical drawing, and some were not easily persuaded of the value of CDT (Penfold, 1988; Toft, 1989). A significant and irresistible change that was taking place in the mid-1980s, however, was the arrival of the common 16+ examination GCSE CDT syllabuses that, under agreed national criteria, finally began to move craft departments away from straight skills-based teaching into the use of project work, designing as well as making, and other aspects of technology. The examination was first taken in 1988 and, therefore, required teaching syllabuses from September 1986. As Penfold points out, having created an amalgamated subject, the GCSE examination allowed three versions: CDT: Design and Realization, CDT: Design and Communication and CDT: Technology. This enabled former teachers of woodwork and metalwork to align with Design and Realization whilst challenging or enabling them to introduce work with plastics, and to move their pupils away from set pieces to more open tasks. Teachers of technical drawing were able to align with Design and Communication, but were similarly opened up to the possibilities of the use of a wider range of graphic media than pencil, tee-square and drawing board. It also gave the growing numbers of *Modular Technology* enthusiasts a CDT: Technology syllabus that closely followed the form of the modular course. In all these courses, design tended to be represented as a series of stages.²⁵

In terms of interest groups and traditions, the three-fold examination enabled a continuation of these within the CDT umbrella. However, the links between the craft, design and technology aspects of CDT are untidy, in terms of historical origins and professional practice. In terms of Goodson's understanding, CDT departments were temporary amalgamations for convenience, and CDT was a subject that had developed from earlier vocational craft subjects into something having greater intellectual appeal and

²⁵ Particular examples of this appear in the case study.

academic respectability, whilst struggling with its educational value and pedagogy for some pupils who had enjoyed straightforward craft activity but found designing more difficult. Despite having many attributes of a functional school subject, CDT by the mid 1980s had not found a clear identity. This is witnessed to by articles in the *CDT Extra* section of the *TES* of 18th October 1985: one entitled *Waiting for a guru*, in which the lack of identity was bemoaned, and another entitled *A legitimate subject* in which a definition of CDT was attempted. In terms of links with activities in the world beyond schools, the three separate strands could all find correlates, whereas it is reasonable to contend that the triumvirate CDT was essentially a functional school subject searching for an identity.

By the time the national curriculum was announced, many CDT departments were beginning to settle down under the influence of a generation of heads of department who had assimilated the CDT rationale. Views about technology tended to be derived from those presented in the GCSE syllabuses under the national criteria for CDT, and much like those identified for the technology interest group. However, below the surface there remained considerable disagreement between individuals in departments and between national interest groups having quite disparate origins and differing opinions. At national level, the contrast between science (represented by the ASE) and CDT was marked. The arrival of the Design and Technology Association (DATA) in 1989 provided the possibility of a unifying body, but the national conference function (part of ASE's role in science) had already been adopted at Loughborough in 1988 in the form of the annual National Conference in Design and Technology Educational Research and Curriculum Development (DATER).²⁶

²⁶ In 1990, DATA announced that three smaller groups were coming under its wing (*TES*, 19-10-90, p. R16). In 1993 DATA and DATER still remained separate.

Like CDT, Home Economics (HE) was also, by the mid 1980s, a subject that had undergone considerable transition. Its development from girls' craft subjects in the utilitarian tradition in secondary modern and possibly technical schools to HE, parallels in many ways that of the development of CDT from boys' craft subjects. Just as teachers of woodwork and metalwork saw the transition to CDT, so teachers of cookery and needlework experienced the transition to HE. The introduction of the "design process" to supplement the teaching of boys' craft skills had been paralleled by the introduction of a similar approach in the teaching of textiles. In the food area, the sequence of teacher-demonstration followed by pupil-practice of set recipes had been superseded by an "investigative approach"²⁷ in which pupils experimented more with ingredients. In the process of gaining "academic respectability" HE had increasingly developed links with science in its approach to the teaching of its conventional subject matter: looking at nutritional aspects of food, and adopting a "scientific process" approach to developing food products, as well as the skills of preparation and presentation.²⁸ Just as the introduction of GCSE had seen three main categories of CDT syllabuses, so there had developed three main areas within HE GCSE syllabuses - HE: Food, HE: Textiles, HE: Childcare. The state of the subject just before the announcement of national curriculum proposals is fairly represented by the contents of the *Home Economics Extra* section of the *TES* of 21st February 1986. Here, the rationale for HE in the curriculum is presented as being relevant to pupils' needs for adult life and paying attention to "the process of learning" (*TES*, 21-2-86, p.37). The rationale locates the development of a range of skills (decision making, investigation, discrimination, analysis and evaluation) which:

although they will be acquired in the context of the management of

²⁷ An example of what this means in more detail is presented in the case study.

²⁸ The HE journal *Modus* (e.g. June 1987, pp. 188-190) and ASE publications (e.g. *Education in Science*, September 1987, p.15) carried articles on the relationship between HE and science.

resources within the home they will also be of value to the pupils in the wider context of society (TES, 21-2-86, p.37).

Such a claim is, of course, subject to the earlier critique that such skills may not be generalizable. In the same supplement there is an article reporting a "Textile technology" course being piloted in one I.e.a. which notes that:

The applied science and technological nature of home economics has been strengthened by curriculum development within the subject (Nuffield Home Economics), and expanded by the Technical and Vocational Education Initiative ... Students need to understand the technology of sewing equipment and the behaviour of textiles in order to live adequately in our society. Cheap, mass-produced clothes and household textiles, mass marketed, often by credit systems, have ousted utilitarian sewing skills, at an everyday level. Button replacement and stitching up the odd split seam apart, these skills are not needed until an understanding of the mediocrity of much mass design comes home to teenagers who then want to find out how to design and make their own articles (TES, 21-2-86, p.42).

Here is evidence of the beginnings of a recognition within HE that aspects of technology education were appropriately taught through HE. The argument is that an awareness of problems with the products of a technological system will lead to a desire to engage in design and craft work, but the reference to technological products is clear. This suggests an awareness of the potential within HE to introduce pupils to technological issues in a way that would counter the criticisms typified by Attar (1989) that HE was a profoundly discriminatory and wasteful subject. Although HE developed from craft origins, the evidence from professional journals (such as *Modus*²⁹ for HE teachers and *The Journal of Consumer Studies and Home Economics* for practitioners other than teachers) is that HE managed to develop and retain a unitary subject identity to a greater extent than CDT, despite having a GCSE structure that was similar. It also maintained clearer links with

²⁹ I conducted a search of an archive of the preceding twenty years' copies of the journal *Modus* and its predecessor *Housecraft*.

activities in the world beyond school: with commercial catering as much as with domestic activities. However, as with CDT, there were residual tensions about pedagogy and the value and nature of the subject within HE. The low status of HE within the curriculum is an issue that emerges from time to time in the pages of *Modus*, and the problem is not confined to one country. For example, in research into curriculum development within HE both McMullan (1987) in Northern Ireland and Roe (1985) in the USA identified low status as an underlying problem for the subject. Locally, the nature of HE taught in schools was sensitive to the nature of the staff at advisory and school level: older staff having their origins in a craft tradition and younger ones having been trained in the more recently-developed approach.

HE teachers were showing awareness of technology as a significant area of human activity that used their subject material (textiles, food), although in curricular terms technology tended to be the machinery (microwave ovens, sewing machines) used within classroom activities, and impinging on the domestic situation.

Art and Design

I previously noted the development of design teaching in conjunction with art, showing how two interest groups brought different views about the nature of the subject and its pedagogy. Dodd (1978, Ch.III) contrasts the approach to design taken in art rooms and workshops: the former tending to free expression, the latter tending to be focused more on an eventual product. The design movement had influenced some art departments away from "fine art" into areas that had more in common with the graphic design that was replacing technical drawing in craft departments. According to Dodd,

If [design] is based on the Art department, it may appear as a fairly free experimental course of visual exercises involving, in the main, two-dimensional work through which the development of novelty and individual sensibility is sought. Design in the workshops may be a very different activity in which the consideration of function and utility is an important part of three-dimensional work in resistant materials (Dodd, 1978, p.54).

This is another aspect (as opposed to that of knowledge application) of the distinction between technological and non-technological design. Dodd goes on to observe that the mix of art and design in a given school was influenced significantly by the views and experience of the teachers involved. The situation by the mid 1980s was derived from that outlined by Dodd, and simply meant that the art departments in some schools would see themselves as contributing to the teaching of design, others would be more inclined to see themselves as firmly in the expressive art area.

Where design was linked with art, views about the nature of technology would depend largely on the origins (industrial or otherwise) of the particular teachers. Where design faculties comprised CDT as well as Art and Design, the CDT view of technology would be present within the faculty, to be agreed with or challenged.

Business Studies

The teaching of the skills of typing and shorthand was an aspect of technical and vocational education that featured in the curriculum of many state schools under the tripartite system. By the mid 1980s, Business Studies (BS) had *de facto* become involved with technology, although in two completely different ways. The first was the development of computer systems that had moved the departments away from shorthand and typing into information systems. The other was that some BS departments taught syllabuses that included the economic information necessarily applied when technology is seen as an activity happening in the industrial and business context.

Extracts from the *Economics and Business Studies* supplement to the *TES* of 26th February 1988 give a flavour of the state of the subject in the mid 1980s. For example:

Business studies departments of the *ancien regime* were concerned with office practice, typewriting, and the occasional bit of book-keeping. Frequently staffed by instructors with little or no formal teacher training, they suffered all the problems associated with the very low status of non-academic, vocational training ... It was unthinkable that large sums of

capital investment be deployed within the business studies area ... but it was. The lowly BS department suddenly began to blossom ... the status of the department began to soar - that is, in those local education authorities brave enough to abandon a few sacred cows and accept vocational (or pre-vocational) subjects as educationally valid (*TES*, 26-2-88, p.45).

Particularly noted in this supplement is the work in Hampshire under its county adviser for business and economics education, Ben Kelsey, which had sought to move the subject into the era of the information systems being employed in industry. Also, TVEI funding and the introduction of Certificate of Pre-Vocational Education (CPVE) schemes, were felt to have supported the transition from the original skills-based subjects. However, it is clear that, as with all development of subjects, local conditions were important:

There no doubt remained isolated backwaters where redoubtable headmasters steadfastly refused to acknowledge that the subject can be used to develop problem-solving skills, unwilling to recognize that approximately 80% of all computer users are found in the world of business, not scientific research establishments. For them, the requirements are satisfied by a few typewriters and a solitary micro sitting in the corner (for special occasions) (*TES*, 26-2-88, p.45).

Some BS departments retained the skills-based and vocational flavour associated with their origins in the pre-vocational training of secretaries, whereas others had taken the arrival of computers to develop a significant cross-curricular input in the teaching of computer literacy. The arrival of computing and information technology in the curriculum is a separate issue (dealt with in McCormick, 1992a), and IT is usually taught separately from D&T within the national curriculum. However, the links between BS and IT, as well as possible contributions to wider technology teaching make the BS subject community a group with an interest in D&T. As with the previously-discussed subjects, a range of views and experience existed between L.e.a.'s and between schools by the mid-1980s.

Rather as in the case of HE, the view of technology as the machinery used was most likely. Business and economics tended to be treated in their own right, with no particular emphasis on technology as a major kind of industrial activity.

I have previously noted how *Control Technology* courses had begun to be included in some science curricula. Some I.e.a's and some individual teachers had also sought to develop similar courses in-house with a view to teaching science through practical applications. However, there was a different aspect of technology becoming a feature of some science curricula by the mid 1980s. The policy statement on science in the curriculum (DES/WO, 1985a) that preceded the national curriculum was much in favour of the value of pupils understanding and learning through the technological applications of science.³⁰ Taking a different emphasis within the use of technological applications of science, the Association for Science Education was producing the first examples of its *Science and Technology in Society* (SATIS) material (e.g. ASE, 1986), in which value-laden applications of science provide a way of engaging pupils both with the way in which science is applied through technology and with the controversial nature of such applications. Such versions of the value of technology in the curriculum come largely from science education interest groups. Views of technology here are that it is about the application of scientific principles. A problem is that the distinction between science and technology tends to be blurred, with the emphasis on applied science. The particular and valuable point that is emphasized is that the applications of science can be controversial, and the pedagogy is designed to enable the discussion of value issues.

Having surveyed the aspects of technology and the teaching rationales in the main subjects contributing to technology by the mid 1980s, I now turn to the views of groups and individuals interested in, and connected with, but not *directly* involved in teaching technology. Her Majesty's Inspectors (DES, 1985a), Professors Black and Harrison (1985), and the Open University (1987b, 1987c) were amongst those active in promoting a view of technology that was wider than, but encompassed, the various aspects contemporarily

³⁰ The evidence obtained by HMI (DES, 1985b) was that there was limited use of technological applications in science teaching.

present in the curriculum and favoured by the interest groups previously discussed.

Broader views of technology in the mid 1980s

The purpose of this section is to highlight the fact that there was considerable discussion of the nature of technology in the curriculum in the period immediately preceding the announcement of its inclusion in the national curriculum, and to identify what was being said about technology. Two HMI publications of the mid-1980s - *Technology in Schools: developments in craft, design and technology departments* (DES, 1982), and *Technology and school science* (DES, 1985b) - confirm that aspects of technology were then most visible in science and (what had been) boys' craft departments. There had been more penetration into the craft area than science, possibly because craft teachers saw the inclusion of technology as a move to academic status whereas science teachers did not have this motivation. The prevailing view in schools and amongst teacher trainers and support staff was that technology was appropriately located within these two subjects. One contemporary form of in-service training operated within the British School Technology programme³¹ specified that schools should send pairs of teachers (one science and one CDT) to its courses. The kind of technology represented here was based on the use of practical equipment in areas such as structures, electronics, mechanisms and pneumatics - the aspects of technology associated with *Control Technology* and *Modular Technology*. Although this was the prevailing situation in schools, there were questions being asked about the view within education of technology in the world that either explicitly or implicitly underpinned this form of technology in the curriculum. Such questions indicate the existence of a philosophical debate about the nature of technology as the foundation on which a curriculum and a pedagogy for technology education may be built, so are usefully explored here.

31 *School Technology* for March 1986 (pp. 6-7) reported a national programme for science and CDT teachers based in I.e.s.'s and at the then Trent Polytechnic arising from a grant of £2.5 million announced in April 1984 by Kenneth Baker, then Minister of State for Industry and Information Technology.

Accepting the interest in technology in both the CDT and science areas, but feeling that many questions were being left unanswered, Black and Harrison (1985) published their booklet *In Place of Confusion* subtitled *Technology and Science in the School Curriculum*. In this they identified the *partial* contribution to a broad technology curriculum then offered within CDT and science. They asked questions about the breadth of technology courses "in danger of being defined as the sum of Civil, Electrical and Mechanical Engineering" (Black and Harrison, 1985, p.13) and observed that:

the technology of such areas as Fibres, Clothing, Food Production and Processing, Nutrition, Biotechnology, Environmental Control, Medicine, Traffic, Urban Design and the whole of the Chemical Industry, to name but a few, are largely ignored. Some of these may be studied in other parts of the curriculum (as in Nuffield Home Economics) *but they are not regarded as part of technology education* (Black and Harrison, 1985, p.13, my italics).

This suggests a very broad knowledge base for technological activity in the world, and also hints at the presence of aspects of technology in other school subjects. At a similar time, but from their previously-noted starting point of a wish to identify discrete areas of learning and experience that might contribute to a broad and balanced curriculum, Her Majesty's Inspectors offered a significant statement about the nature of technology in the world. In describing a *technological area of learning and experience*, they suggested:

The essence of technology lies in the process of bringing about change or exercising control over the environment. This process is a particular form of problem-solving: of designing in order to effect control. It is common to all technologies including those concerned with the provision of shelter, food, clothing, methods of maintaining health or communicating with others, and also with the so-called high technologies of electronics, biotechnology and fuel extraction and the alternative technologies of the Third World (DES, 1985a, Section 84).

A feature of this statement is that it refers to technologies in the plural. But it acknowledges that, at a *general* level there are some processes common to a range of

technologies (problem solving and designing are named). However, there will be content knowledge that will be specific to a particular technology. Food and clothing are named as areas of technological activity as much as electronics and fuel extraction. Again, the knowledge base across various technologies is perceived as broad.

The view of technology provision in the curriculum as being located in CDT and science was recognized as the *status quo* in Open University in-service courses in technology education planned in the mid 1980s (O.U. 1987b, 1987c). However the view of technology represented in its then Technology Foundation Course *Living with Technology* (Open University, 1981), around which the in-service courses were structured, did also raise the possibility of technology being contributed to from other subjects. *Living with Technology* identified technological issues and content in the areas of home, communications, energy, resources, food and health. Consequently, for example, there is reference (Clegg, Medway and Yeomans, 1987, pp. 37-40) to the potential contribution to the technology curriculum from Home Economics (in the light of the significance of the food and textile industries), the humanities (in the light of the value issues involved in technological activity), and other subjects.

From such interest groups and individuals connected with technology education, therefore, there were questions being asked about the breadth of existing technology courses, based on a view about technology in the world. Groups advocating technology for all (i.e. girls and boys from 5 to 16: pupils with learning difficulties) were raising questions about the nature of the technology found in the curriculum (e.g. as reviewed in Clegg and McCormick, 1988). The discussion of broad and subject-based interest groups has indicated how a range of pedagogies is associated with particular groups and found expression in particular forms of "technology" syllabus and other inclusions in the curriculum. The issue of pedagogy is the third area of technology identified in my first hypothesis as being subject to differences of interpretation. I have already shown that different pedagogies are felt by interest groups to be appropriate to their favoured aspect of technology in the curriculum. I consider pedagogy now in more detail as the final part of

the background against which national curriculum D&T was specified. It deserves particular attention because D&T as defined selects particular educational aims which, if they are to be met, need an appropriate pedagogy.

Seeking an appropriate pedagogy

The pedagogy that is appropriate in a given situation needs to match the aims for the subject. Thus, for example, the aim of developing making skills requires a different pedagogy than that for developing the ability to weigh value issues in decision-making. As well as asking questions about the vision of technology in the world that underpinned contemporary views of technology education, Black and Harrison also addressed the range of aims that interest groups had for technology in the curriculum. They found three broad categories of aims:

to give children an *awareness* of technology ... to develop in children, through personal experience, the *practical capability* to engage in technological activities, and ... to help children acquire the *resources* of knowledge and intellectual and physical skills which need to be called upon when carrying out technological activities (Black and Harrison, 1985, pp. 3-4).

This usefully summarizes into broad categories the range of aims that existed for technology education. However, it is one thing to identify broad aims, but another to ask in more detail what it might mean at the level of pedagogy in a particular subject. Black and Harrison were defining the nature of capability as drawing on resources of knowledge and skills in the context of solving problems.³² The APU was also trying to tease out the nature of capability within its lengthy investigation into design and technology.³³

³² This approach to the development of capability found its way into materials being developed by the Nuffield Foundation for the teaching of D&T (Barlex, 1993).

³³ This produced three principle documents (APU, 1981, 1987, 1991): the first two formative and preceding the national curriculum debate in England and Wales, and the last one presenting the findings of their investigation.

Its first document started:

An understanding of design and technology comprises the skills, knowledge and values by which men and women, and therefore boys and girls, come to grips with the problems of living in, and exerting their influence upon, the man-made [*sic*] world ... When considering the question of monitoring performance in this area, assessment should go beyond awareness and understanding, important though these are, and centre on technological capability. This is seen as the ability of an individual pupil to control or fashion the material environment by personal intervention in order to improve and enrich the quality of life (APU, 1981, p.2).

This suggests a "weak" view of awareness as being of less significance for the individual pupil than capability. Capability was seen as a "complex of activities" (APU, 1981, p.2). In terms of identifying such an ability for assessment, the APU suggested that it needed to combine selected *skills* (investigation, invention, implementation, evaluation), a selected area of *knowledge* (control, energy, materials), and a set of *values* (technical, economic, aesthetic, moral) (pp. 4-7). Black and Harrison (1985) took a stronger view of the value of awareness than the APU. McCormick (in O.U. 1987a, pp. 15-17) developed the two concepts of awareness and capability to show how they needed differently to integrate various kinds of knowledge, skills, understandings and attitudes (Figure 2.3 below).

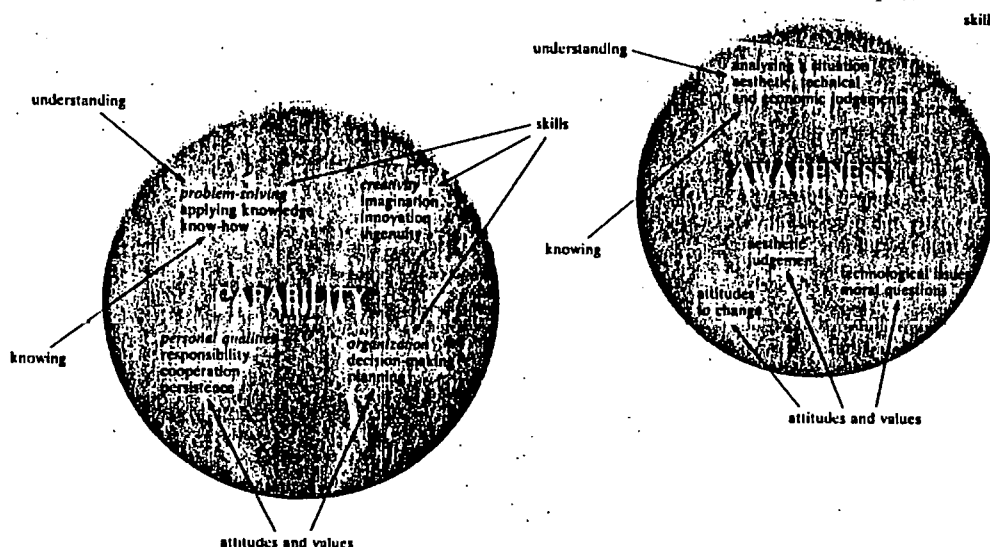


Figure 2.3 Conceptualization of the nature of technological awareness and capability (after McCormick).

The point about such an attempt to understand the nature of capability and awareness is that it demonstrates the complex nature of each, suggesting that their development in pupils requires a carefully-constructed pedagogy. I have previously indicated the increasing level of doubt cast by recent research on the existence of generalizable problem-solving skills, suggesting that the more that is learnt about the nature of children's learning in D&T, the more circumspect have to be the claims about its potential. Consequently, there appears to be a need for more careful thought about the nature of capability, and how it can be developed - a point on which I shall reflect in the final chapter.

In the same O.U. text, Sparkes suggested a view of the broad aims of "technology education for all" in terms that included awareness and capability (Figure 2.4 below). The suggestion here is that different groups of people need aspects of technology education having different aims. It offers one perspective on the relationship between vocational and general education, and highlights the difference between technical (which is narrower) and technological (which is broader) education.

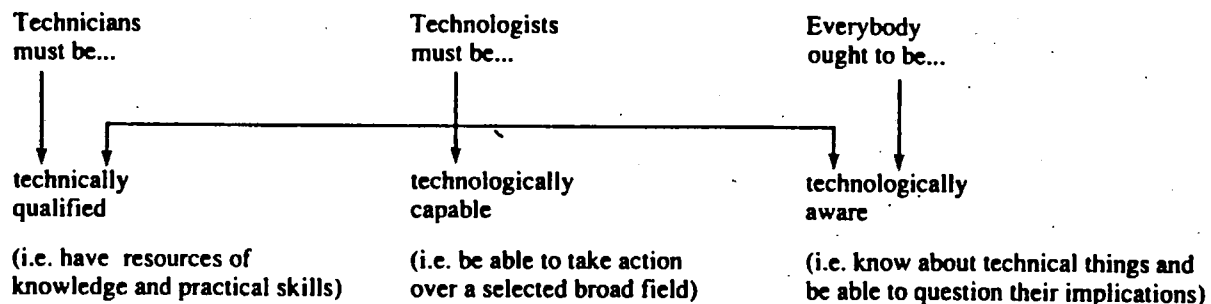


Figure 2.4 Technology education for all: awareness for all and capability for some.

The fact that children now start studying technology at age 5 indicates that the aims must be inclusive for a very long time unless some groups of pupils are going to find themselves prevented from becoming technologists. However, those who will become professional technologists are likely to be a minority of all school pupils, so there is a debate about which aims should apply most significantly in various curricular circumstances. Aiming for all children who will become citizens and voters in a technological world to develop an awareness of how technological issues affect their lives requires a different pedagogy from, for example, aiming for children to become potential contributors to a technological workforce. Therefore the existence of a range of different aims having a range of disparate pedagogies adds further to the debate about the nature of technology education. In particular, a focus on capability, with individual pupils designing and making their own products, tends to draw attention away from, for example, class debate about the social consequences of the technological activities of others.

Review of the validity of the first hypothesis and introduction of the second hypothesis

The evidence presented in this section has confirmed my hypothesis that there was a lack of agreement between interest groups about all aspects of technology education at the time prior to its being named for inclusion in the national curriculum. The multiplicity of views came from disparate interest groups, some of whom were lobbying for new developments in the curriculum, and some of whom were lobbying from a position of already contributing to the curriculum. All the groups had particular reasons for wanting to see their favoured aspect of design and technology in the curriculum, and had differing views of technology in the world and in the curriculum, and different aims for technology education and about an appropriate pedagogy. Some of these groups had origins in the projects and initiatives of the 1960s, and some individuals continued as significant figures in interest groups that remained strongly committed to views that had emerged from the early experience of such projects. Compared with science, technology had a much more disparate range of interest groups. There was not a unifying subject community to represent the cause of technology in the national curriculum debate. The consequences of

this situation at national level in the circumstances of defining a new national curriculum subject are the subject of the second hypothesis, which will be introduced shortly and whose validity will be examined in section 2.4. The consequences at school level will be considered in the case study in Chapters 4 to 7.

Developing his socio-historical argument about the growth of subjects, Goodson (1987) makes a third point (following his two about subjects as coalitions and the progress of subjects towards academic status), that:

much of the curriculum debate can be interpreted in terms of conflict between subjects over status, resources and territory (Goodson, 1987, p.3).

The broad range of subject and other interest groups having views about, and stakes in, technology in the curriculum suggests the potential for such conflict in the specification and implementation of technology to be taught to all pupils. The second hypothesis follows from the first and bears in mind Goodson's observation about conflict.

The second hypothesis is that the range of interest groups in technology made the process of specifying the nature of the subject within the national curriculum difficult, and the national intentions controversial.

This hypothesis will be examined against two sets of evidence in the remainder of this chapter. It will be examined firstly against some of the responses that were made publically when the form of technology in the national curriculum was being determined between June 1987 and the publication of the statutory Order (DES/WO, 1990) in March 1990. It will be examined secondly by considering some of the public debate that followed the publication of the statutory Order for technology in 1990. As well as verifying the hypothesis, this latter discussion of the debate about the Order will illuminate the nature of the subject that had to be implemented in schools, and will indicate the national background against which local decisions affecting its implementation in Upgrove School were made.

2.4 The specifying of D&T in the national curriculum

The naming in 1987 of *Technology* as a foundation subject in the national curriculum for all pupils from ages 5 to 16 (DES/WO, 1987, p.6) was described in the September 1987 edition of *School Technology*³⁴ as "something momentous". It certainly marked a significant event coming quite close on the heels of McCulloch, Jenkins and Layton's (1985) rather downbeat conclusion that, despite much effort, there had been no "*Technological Revolution*" in the curriculum. However, the potential of this momentous event needs to be set in the context of competing interest groups.

In this section I consider the validity of the second hypothesis as follows. First, I consider some immediate responses provoked by the publication of the national curriculum proposals (DES/WO, 1987) in June 1987. Then I consider the emerging nature of technology as an intended school subject, presenting some of the published reactions to this. Together, these will demonstrate how the development of a national specification for technology was difficult and controversial.

Three features associated with that first naming of technology as a national curriculum foundation subject had particular consequences. The first was that technology appeared to have been separated from design and the second was that technology was named separately from science. Both these features need exploring in the light of the previously-identified strong links between technology and science and technology and design. The third was that Home Economics was not named in the list of foundation subjects. I shall deal with each of these in turn.

The only explicit mention of *design* in the government's consultation document came in proposals for Y10 and Y11, where the suggested allocations of curriculum time included

³⁴ A magazine published by the National Centre for School Technology based at the then Trent Polytechnic, Nottingham. The magazine was edited by Geoffrey Harrison, formerly of *Project Technology*, so tended to represent the views of that interest group.

Technology (10%) and Art/Music/Drama/Design (10%) (DES/WO, 1987, p.7). The associating of design with a "creative arts" grouping rather than with technology did imply a particular view of the nature and location of design, although this did not deny the possibility that technology as named implicitly contained aspects of design. This *apparent* assignation of design apart from technology was relatively short-lived, because the working group³⁵ formed in April 1988 was immediately named as for *Design and Technology*.

It was left to the working group to sort out the relationship between design and technology, and also the place of Information Technology. The *Terms of Reference* (DES/WO, 1988a, p.87) and the *Supplementary Guidance to the Chairman* of the working group (reproduced in DES/WO, 1988a, pp. 90-95) make it clear that there was no preconceived idea about how technology and design would emerge into the timetable and relate with existing subjects. For example, the *Terms of Reference* stated:

The group should start from the basis that technology is an area of study in its own right, with its own distinctive objectives and content. This does not necessarily mean that technology must be a separately timetabled subject ... Design will be an essential part of technology ... but will also draw on and contribute to other areas of the curriculum. The Working Group is asked to consider design in all its aspects ... recommending attainment targets for those of particular importance in technology and recommending a framework within which other aspects will need to be developed in other subjects (DES/WO, 1988a, pp. 87-88).

There are hints of design being seen as process and technology as content, but also as design being present in its own right and sometimes within technology. But at this stage

³⁵ Each national curriculum subject was drawn up initially by a working group which had to draw up an interim and final report which were subject to consultation before the drafting of the statutory Order. The working group's *Terms of Reference* (reproduced in DES/WO, 1988a, pp. 85-89) referred immediately to the National Curriculum *Design and Technology* Working Group (although *Technology* remained and still remains the statutory *subject*). The first large-scale publication on the national curriculum (NCC, 1989c) subsequently included the designation "technology (including design)" in its list of foundation subjects.

(the second half of 1988) there was ample cause for lobbying and debate by the various interest groups.

Turning now to the relationship with science, it became immediately apparent that the two would have to be separately *specified*, even though emphasis was placed on the links between the two. The *Terms of Reference* of the design and technology working group said "pupils will draw on knowledge and skills from a range of subject areas, but always involving science or mathematics" (DES/WO, 1988a, p.87). The initial intention (DES/WO, 1988a, p.85) was that the *science* working group would consider science in all four Key Stages and technology in KS1 and KS2 - suggesting that it was felt that, at primary level, the links between science and technology were strong enough (or their differences insignificant enough) to merit a coordinated approach to their teaching. Although the science working group made an initial statement about its view of technology (DES/WO, 1988b, p.7), the situation changed in July 1988 with the Design and Technology working group taking responsibility for all Key Stages. The Design and Technology working group's *Interim Report* (DES/WO, 1988a), therefore, made initial suggestions about both D&T and IT as separate profile components for all Key Stages. The rapidly-emerging scenario was that a gulf was appearing between science and technology.

The third significant feature of the response to the initial proposals was that from the HE interest group. The general consultation document (DES/WO, 1987) omitted Home Economics from the list of foundation subjects and included it only as an optional GCSE subject in Y10 and Y11. HE was well established in the curriculum of Y7-Y9 in most secondary schools, so its omission prompted a vigorous initial response to the Secretaries of State from the National Association of Teachers of Home Economics (NATHE), which was reproduced in the September 1987 edition of *Modus*, the association's magazine. Here, the case for including HE in the national curriculum was closely argued with reference to DES/WO publications, but the strength of feeling was also made quite clear:

the curriculum outlined by the Secretary of State is regarded as narrow, ill

advised and, if imposed, will not be giving effect to a broad national consensus but will be an imposition of his will (NATHE, 1987, p.36).

Having lost a place in its own right in the curriculum of Y7-Y9, part of the lobbying was directed at challenging this decision, but attention also turned to finding alternative rationales for continuing presence in the curriculum, not least the straws in the wind of the *Supplementary Guidance* to the chairman of the Design and Technology working group which suggested "The working group should also take account of the possibilities of links with other relevant subjects such as art, home economics and business studies" (DES/WO, 1988a, p.92). It has already been noted that some within the HE subject community had begun drawing attention to the potential contribution of that subject to the teaching of technology. In other parts of the U.K. (particularly Scotland) it is possible to see how the technological contribution from HE has been worked out *within HE as a continuing independent subject*. In England and Wales, however, there emerged a vigorous interest group in the D&T arena. The main thrust of the argument from HE was that the process of design was carried out as appropriately using HE materials as with CDT materials.³⁶ A strong emphasis was placed on the fact that the home is an increasingly technological environment. One factor that appears to have been underplayed by the HE interest group was the size and significance of the food and textiles industries as technological organizations producing outputs that affect everyone (as previously identified in the quotations from HMI and Black and Harrison on p. 49), and as dealing with materials such as textiles and foods that, seen as materials used within technological processes, needed quite different handling requirements from resistant materials.

It should be noted that the national response of HE to the initial national curriculum proposals was different from that of the other subjects named as possibly linking with technology. Art had its own place in the national curriculum, and business studies (BS)

³⁶ The submission by the National Association of Teachers of Home Economics to the working group structures its argument in part around the design and technology *process* diagram developed by the APU (NATHE, 1988, p.7).

was usually taught only as an option in Y9 to Y11. So art and BS did not feel under threat in the same way as HE.

The emerging nature of D&T

I shall now consider what emerged by way of views of technology in the world and in the curriculum, and of pedagogy, as the national specification of D&T was developed. There was some valuable philosophical thought underpinning the development of Statements of Attainment and Programmes of Study - notably section 1 of the interim report (DES/WO, 1988a, pp. 1-18) and section 1 of the proposals of the Secretaries of State (DES/WO, 1989, pp. 1-7). In both places was to be found a broad view of technological activity and offered the potential for a subject finding strong links with technological activities in the world and offering considerable learning opportunities for pupils. However, it is interesting to note the retrospective comments of one member of the working group who notes that:

The educational reasoning underlying the new subject was exquisitely set out ... in the interim report of the working party ... but then came the grinding drudgery of translating some very clear and easily understood concepts into the language of attainment targets, programmes of study and statutory instruments ... we went through endless debates about how many attainment targets there should be, what knowledge, skills and values should be covered, how we could adequately describe progression and how much weight to give different aspects of the work. It is extremely difficult to find 10 different statements implying 10 measurable levels of attainment³⁷ applicable to skills such as solving problems, designing or making artefacts (Hunter, 1993).

So, whereas philosophical thinking was there, it tended to be submerged by the practicalities of developing proposals for a statutory Order. The working groups proposals

³⁷ The report of the Task Group on Attainment and Testing (DES/WO, 1988c), which preceded and underpinned the work of all the working groups, specified the need for ten levels of attainment between ages 5 and 16.

were themselves subjected to considerable change as the result of the activities of interest groups. Under a heading *Last-ditch rescue bid on draft Order*, the magazine *Education* of 12th January 1990 reported that:

A group of high-powered technology specialists ... are angry because they feel the National Curriculum Council has watered down the far-reaching proposals of the working group ... Professor David Layton ... a member of [the working] group ... blamed people "at the highest level" in the NCC for tinkering with the wording of the report and trivializing some of the most important concepts (*Education*, 12-1-90, p.29).

In a thoroughgoing critique of the "*creation of a "subject" by committee*", McCormick (1990a) notes that:

Whatever the considered view of the Working Group the NCC then modified the ATs and PoS of the Final Report ... The Council had to assimilate in a short period of time an understanding of the issues that the Working Group spent a year on (no NCC representatives were on the Group or in attendance) ... how could [the NCC] be expected to represent adequately the breadth and depth of technology in the short period of time it had? ... we should not be surprised when the result contains inconsistencies and problems (McCormick, 1990a, p.45).

Amidst the politicking of interest groups and the machinations of working group and NCC, a view emerged of which subject groups would be expected to contribute to the teaching of D&T, as did a view of the nature and rationale of D&T. Between the setting up of the working group in April 1988 and the publication of the statutory Order in March 1990 there was considerable formal opportunity for interest groups to respond and make suggestions: following the interim report (DES/WO, 1988a) and again following the final report contained in the proposals of the Secretaries of State (DES/WO, 1989). The NCC noted the receipt of 560 formal responses and 1290 letters commenting on the proposals of the Secretaries of State (NCC, 1989a, p.7): representing extensive serious interest alongside the continuing public polemical debate throughout the process. The nature of the emerging views about technology, and the influence of interest groups, can be traced as

follows from the documentation made public during the process of specification.

The government's Terms of Reference given to the Design and Technology working group stated:

the working group is to view technology as that area of the curriculum in which pupils design and make useful objects or systems, thus developing their ability to solve practical problems. The working group should assume that pupils will draw on knowledge and skills from a range of subject areas, but always involving science or mathematics. They should be taught the principles and practice of good design, the application of theoretical knowledge, and within that context the practical craft skills needed for realizing their designs in wood, metal, plastics, textiles and other materials. They should also learn about the variety of modern materials and technologies in use in the industrial and commercial world. Pupils should prepare for the world of work by learning how to work in teams as well as by themselves; by understanding the importance of functional efficiency, quality, appearance and marketability; and about the importance of working within financial and technical constraints (DES/WO, 1988a, pp. 86-87).

Here can be seen influences from the craft origins ("practical craft skills") whilst acknowledging changes in materials used in the world (plastics, as well as wood and metal). Here also can be seen the influence of aspirations for vocational ("world of work") as well as general education. Also included are clues as to why BS (marketability and financial constraints) and HE (textiles) might be considered as contributing to D&T, and the integrative nature of technology drawing on a wide range of subject matter is indicated.

Rather than define the terms design and technology, the interim report concentrated on elucidating the "nature of design and technological activity". The report states:

design and technology is always purposeful (i.e. developed in response to perceived needs or opportunities, as opposed to being undertaken for its own sake), takes place within a context of specific constraints (e.g. deadlines, cash limits, ergonomic and environmental requirements as opposed to unconstrained, blue-sky research) and depends upon value judgements at almost every stage (DES/WO 1988a para.1.11).

In asking the question "what is it that pupils learn from design and technological activities which can be learnt in no other way?", the report concludes that: "In its most general form, the answer to this question is in terms of capability to operate effectively and creatively in the made world" (DES/WO 1988a paras 1.9, 1.10).

It is significant that this capability is expressed within this rationale section of the interim report as pupils being able to

use ... make critical appraisals of the personal, social, economic and environmental implications of ... improve, and extend the uses of ... design make and appraise ... diagnose and rectify faults in artefacts and systems (DES/WO, 1988a, pp. 17-18).

There is much here that is in the area of non-designing technology in Figure 2.1, and much to enable a framework to cover awareness and capability, and the needs for general and at least prevocational education. However, this needs setting against the strongly-emerging presence of design in conjunction with technology. In its first (interim) report, the working group indicated the way its thinking on this issue was going by insisting that:

Our use of design and technology as a unitary concept, to be spoken in one breath as it were, does not ... embody redundancy. It is intended to emphasize the intimate connection between the two activities as well as to imply a concept which is broader than either design or technology individually and the whole of which we believe is educationally important. (Accordingly we use design and technology as a compound noun taking the singular form of verbs in what follows.) (DES/WO, 1988a, p.2).

This guaranteed the place in the curriculum of a newly-confirmed unitary concept, following the earlier example of the APU. A curricular linking of two distinguishable activities was being reinforced. A rider noted by the working group was that:

Our understanding is that whereas most, but not all, design activities will generally include technology and most technology activities will include design, there is not always total correspondence (DES/WO, 1988a, p.2).

This is a statement of intent for curricular activities that is consistent with the representation in Figure 2.1, provided the overlap is considerable. Such a view may satisfy the strong advocates of design in the curriculum, but it draws attention away from the many aspects of technology that are not to do with design.

The consequence of sustaining a high profile for design meant that much of the breadth of technological activity did not feature in the detail of the subject. What eventually emerged for D&T was a statutory Order (DES/WO, 1990) structured around four attainment targets (ATs) based on *processes* associated with designing and making:

AT1: Identifying needs and opportunities

AT2: Generating a design

AT3: Planning and making

AT4: Evaluating.

The way this was interpreted through the Statements of Attainment and Programmes of Study locked these processes firmly into products³⁸ designed and made by pupils, suggesting a pedagogy derived from that of CDT. The words used in the D&T ATs were familiar to CDT teachers. For example, the HMI publication *Craft, design and technology from 5 to 16* (DES, 1987) contains a view of designing-making that refers to all of these processes. However, this view of D&T marginalized the potential for aspects of technology not related to capability in designing and making. The interim report's initial identification of a broad capability had been lost, suggesting that other aspects of technology, such as awareness of technological issues in society, would be more likely to

³⁸ The 1990 Order specified artefacts, systems and environments as desirable outcomes. This attempt to broaden the scope of outcomes turned out to be so unhelpful to teachers that the nomenclature was dropped in the 1992 revised proposals (DFE/WO, 1992).

feature in other subjects. Peter Medway observed in the *TES* of 19th October 1990 that:

design activities not normally thought of as technology are admitted while technological activities not involving design are excluded.

What is presented as experience of the practical is in fact confined within an untypical, rationalistic design activity. In overemphasizing the design process, in undervaluing important aspects of real technological practice, and in combining functions normally exercised by different people in different contexts, the curriculum erects a spurious version of "design and technology" which could be as artificial, as school-specific and as unrelated to real-world practice as was the traditional science lesson (*TES*, 19-10-90, p.R7).³⁹

This is strongly suggesting that D&T is lacking the necessary links with the outside world, becoming perhaps a functional school subject but losing links with the wider world. D&T seemed likely to be taking the already disparate nature of CDT and confusing it even more by the addition of inputs from other subjects.

Medway (in his *TES* article) further complained that:

the planners of the D&T part of the curriculum apparently approached their task in a new way, not by consulting relevant university disciplines but by incorporating the activities of practitioners ... pupils will experience a strange collection of functions which outside school would almost never be exercised by one person ... the range extends from shopfloor to senior executive roles, from domestic to industrial roles, from production to retail and distribution to negotiation with clients, and from one-off jobs in home or workshop to mass production (*TES*, 19-19-90, p.R7).

I have shown how subjects need not necessarily be linked with academic disciplines, which is Medway's suggestion, but may reasonably be linked with other activities in the world. Indeed, much of the evidence is that technology is sensibly represented as a *field*

³⁹ Medway later elaborated this criticism in a longer article - see Medway (1992).

(rather than a form) of activity. However, even if it is human activities that are to form the basis of the subject, a coherent framework for the subject needs establishing, and Medway suggests that it is this that is lacking.

The preceding discussion has demonstrated the validity of the second hypothesis. The outcome of the consultation process - the 1990 technology Order (DES/WO, 1990) - was the controversial solution to a problem of definition that had attracted comment from a wide range of interest groups. Despite evidence in the various documents of clear and innovative thinking about the nature of technology in the world and in the curriculum, what emerged was an inevitable compromise shaped by the views of these interest groups. Given the obvious constraint that D&T would have to be taught by teachers of existing subjects, it is possible even so to suggest that those teachers needed something rather more coherent with which to engage.

The second hypothesis was directed at the process of defining a subject at national level. The existence of a range of interest groups having disparate views, as demonstrated through consideration of the first hypothesis, led to the second hypothesis, and also leads to the third, which is now introduced.

Whereas curriculum historians tend to focus on subject conflict at national level, I am particularly interested in the circumstances in which this may happen at school level.

The third hypothesis is that some conflict is inevitable at school level when teachers from different interest groups (within and between subjects) are required to work together to implement the new nationally-specified subject.

The third hypothesis, therefore, relates to the next stage in the process of developing D&T: its implementation in the local school situation. In the concluding section of this chapter some pointers will be given to initial concerns about its implementation, identifying potential points of conflict. The third hypothesis will then be examined against the evidence from the case study in Chapters 4 to 7.

Prospects for implementation

Alongside and connected with emerging views about the nature of technology in the world and in the curriculum, issues relating to the implementation of D&T in schools gradually became clearer. By early 1989, it was becoming increasingly apparent that the specification and subsequent teaching of technology represented a different problem to other national curriculum subjects. From the interim report (DES/WO, 1988a) onwards, the emerging documents insisted that it could not be taught within any single existing department. The problem of definition at national level would have to be addressed first, but would then be likely to reappear at school level when teachers from different subject areas began to work out the details of schemes of work. The D&T working group's interim report became available at the end of 1988 and stated:

Schools will need to identify the team of teachers who will be responsible for any timetabled sessions on design and technology and for co-ordinating design and technology experiences in other lessons. This may involve staff whose specialisms include science, mathematics, CDT, home economics, IT and business studies (DES/WO, 1988a, para 2.45).

This quotation exemplifies the fact that there was then still no definitive view that D&T would appear *as a timetabled subject* and that contributions were anticipated from subjects that would have their own national curriculum document to implement. However, there was precious little other than D&T that *CDT departments* would be likely to be doing within the national curriculum. The CDT interest lobby at national level, united for this purpose, was making it quite clear that D&T could be taught as a subject timetabled for CDT teachers to which other subjects could contribute. When the working group's final report came out in June 1989, the wisdom about the contributing subjects had changed slightly (perhaps as a result of the pressure from HE), because now it was stated that D&T would involve:

the coordination of design and technological activities currently undertaken in art and design, business studies, CDT, home economics and IT (DES/WO, 1989, para 1.2).

This clarified the possibility of a contribution from HE (as well as the others). Regarding the arrangements for implementing D&T, Paul Griffiths,⁴⁰ wrote in the *TES* of 23rd February 1990, that:

There are wide-ranging management implications raised by the proposals and perhaps the first priority is to identify and set up short-term and long-term strategies necessary for the ideals presented in the report to be achieved. Many of these will be matters for schools, but others, such as new teacher training, Inset, teacher supply and some aspects of resource funding, will lie with the training institutions and the Department of Education and Science (*TES*, 23-2-90).

This directs attention towards the need for *strategies* for implementation. Difficulties of implementation of technology in the curriculum had been identified by McCulloch, Jenkins and Layton (1985) who had concluded from their survey of the field that by the mid-1980s there had been no "Technological Revolution" in the curriculum. They attributed this to three causes:

- a) That it resulted from "tensions and divisions among the reformers themselves" (p.209)
- b) That the reformers "failed to agree among themselves as to the nature and implications of ... a rationale [for applied science and technology in schools which would be convincing to teachers, administrators, and the various interest-groups in the field]." (p.211)
- c) That "Individuals and groups with a precise sense of the changed attitudes which they wished to instill often displayed only rudimentary understanding of the dynamics of curriculum change." (pp. 211-212)

They presented their own evidence for their conclusions, but it is informative to apply their criticisms about "rudimentary understanding of the dynamics of curriculum change"

40 Member of staff of the then Thames Polytechnic.

to points made about D&T by Geoffrey Harrison (who had been an activist for technology since before the days of *Project Technology*) in the *TES* of 23rd February 1990. He observes that:

A misleading but inevitable part of the emergence of technology as a subject in the national curriculum has been the indication that its activities are currently found in five particular subjects in schools. This is leading many schools and local authorities to plan their introduction of design and technology by simply requiring those subjects to get together and sort things out. The resulting haggling over percentages and timetables is leading to numerous, very pragmatic decisions on responsibilities and methods of delivery. If a new academic discipline emerges from such an approach it will be luck that has arranged it, for the delivery of these subjects is, itself, so diverse ... We cannot plan for a new discipline by identifying 10 per cent of this and 20 per cent of that. The approach must be the other way round. We must define the subject and then see *who* can contribute to it, using *what* resources in what accommodation (*TES*, 23-2-90).

Here was an appeal for the subject, viewed as an academic discipline, to be defined in such a way that it would have internal integrity, rather than being an assemblage of parts from existing subjects. In one sense, it was an appeal for the Order to be connected with the philosophy that had been apparent in the working party's reports, and it is certainly an appeal that it should be more than a functional school subject. However, it is couched in terms that seem to validate the view of McCulloch *et al* (1985). Certainly, the calls for some kind of explicit rationale for the Order need heeding if teachers are to develop some kind of understanding of what they are to do. But the case study in Chapters 4 to 7 will show that haggling and pragmatic decisions were inevitable as the struggle between interest groups transferred to school level. It is precisely the *diversity* of the existing situation in schools as identified by Harrison that makes the detail of implementation unique to a setting, and requires the implementation process to be investigated and understood in a particular setting. While Harrison was quite right to worry about the lack of evidence of a rationale at school level, his conclusion that spelling out the rationale for teachers was all that was required to ensure a sound implementation, reflects what I will

show in Chapter 3 is a rationalistic view of implementation. I shall demonstrate that such a view is not adequate as a basis for planned change.

In this chapter I have focused on the influence of subject and other interest groups on the formation of a national specification for technology in the curriculum. The discussion has indicated that aspects of technology were being advocated for inclusion in the curriculum well before the decision was taken to make it a statutory subject for all pupils. However, this proposed inclusion of technology in the curriculum of all pupils *was* a significant event, not least because of the statutory requirement to implement it to a given schedule. The final section has confirmed the continuing existence of tensions and divisions, and has shown how a range of rationales prevailed into the period of the development of the intended nature of national curriculum D&T. There have also been foreshadowed some of the likely problems of implementation of the new subject. In the next chapter, I shall turn to a discussion of the details of the "dynamics of curriculum change" whose understanding is crucial to the effective implementation of a new subject such as D&T. Further hypotheses will be introduced in Chapter 3, and the validity of these and the third hypothesis will then be considered in the case study of Chapters 4 to 7.

3 The dynamics of curriculum change

3.1 Introduction

The introduction of the national curriculum in England and Wales is one example of a **planned change** applied to the curriculum within an education system. By planned change I mean projects of various kinds¹ setting out with deliberate intentions of changing the *status quo*. The forty years preceding the decision to introduce the national curriculum had seen the school curriculum as an increasingly important focus for planned change in countries on both sides of the Atlantic. Many of the previous attempts at planned change were politically motivated, and were supported by considerable sums of money. Two significant features of the forty-year period can be noted. First, there was an increasing perception on the part of the funding authorities that the desired outcomes of the projects were not being achieved. Second, there was a growth in curriculum studies within higher education institutions. I shall show how, as curriculum studies developed an understanding of the curriculum and the process of changing it, the *reasons* why the planned changes were not happening became more clear. On the one hand, therefore, curriculum scholars developed a better understanding of the processes of curriculum change. On the other hand there was disenchantment on the part of governments funding change. This resulted in calls for increasing accountability and better returns for reduced investment, and doubts about the value of the curriculum industry that had grown up. Within the context of accountability, the national curriculum has particular characteristics of the legal enforcement of curricular requirements through statutory Orders specifying in broad terms what should be learned (through programmes of study) and what would be assessed (through statements of attainment). There was no intention to generate teaching materials.

The introduction of the national curriculum represented a change of great magnitude to be effected by schools, departments and individual teachers. The change was required within

¹ Some projects in science in the USA and the UK (e.g. Nuffield science) were very large undertakings, whereas some technology projects in the UK were relatively small. The intention in most cases was to generate a range of teaching materials.

a very short time period and with restricted support for teachers. This thesis argues that there was inadequate understanding of *what* was being changed (the curriculum) and *how* it should be changed (the change strategy) on the part of those requiring the change. In order to provide a framework within which to develop that argument, this chapter considers in turn the nature of curriculum and the change process. My thesis maintains that an over-simple view (on the part of those requiring change) of curriculum and the processes of changing it has two effects. First, it adversely affects the ability to respond of those having to implement curriculum change. Second, and consequently, it affects the outcome of the desired change in terms of the nature of the school subject that is implemented. If those seeking change subsequently make judgements about the perceived outcomes which are similarly based on an over-simple view of curriculum, they are likely to come to flawed conclusions: a point on which I shall reflect in the final chapter.

The previous chapter included a tacit assumption that the curriculum comprises no more than "that which should be taught". It was a reasonable assumption to make in a discussion of school subjects, not least because that is the way the word "curriculum" is used when referring to the national curriculum. However, just as the exploration of the nature of school subjects in the previous chapter revealed considerable complexity, so will an exploration of the nature of curriculum. Any attempt within this thesis to understand the *dynamics of curriculum change* without first clarifying what comprises *curriculum* is likely to founder.

In exploring the nature of curriculum, consideration is given to who is interested in and involved in the initiation and implementation of curriculum change. In the case of the national curriculum, teachers had to carry out the change in response to governmental requirements. It is appropriate, therefore, to develop a view as to the roles played by teachers, government and others in the determination of the nature of the curriculum. In turning to curriculum change, issues relating to the involvement of people in the change process are then discussed through asking what kind of strategy is appropriate in the light of what has been learned about curriculum change over the last forty years. Here the ideas

of Fullan (e.g. 1982, 1991) on the meaning of educational change are linked in particular with those of Chin and Benne (1976) on change strategies. Finally, because the school is the basic educational unit in a local context within which curriculum change has to be effected by each subject teacher, the nature of schools, departments and the job of teaching are each considered as they might affect the change process.

3.2 Curriculum and change

The first task in this section is briefly to indicate the breadth of meaning of curriculum. This enables the nature of the national curriculum as specified through statutory subject Orders to be located against the much broader background of understanding of the role of the curriculum as it is implemented by teachers in schools within society. The curriculum is just one aspect of the country's education system, which in turn has a relationship with the society in which it operates. The nature of curriculum needs to be understood in that overall context because teachers who implement it are expected to respond to changes whose origins are elsewhere than in their immediate work situation. The second task in this section is, therefore, to consider the sources of educational change in general and curriculum change in particular, in order to see in what circumstances teachers might reasonably be expected to change what they are teaching. The curriculum also has to be understood as it is implemented by teachers working as part of an overall education system. That system expects teachers to put the curriculum into practice but also provides support for them in so doing. The system as teachers understood it was set up under the 1944 Education Act, so the *status quo* under that Act needs establishing as part of the context in which teachers were faced with the changes brought into effect by the 1988 Act. Only by seeking to understand the implementation of curriculum in this context from the point of view of teachers can sense be made of the change process initiated by the introduction of the national curriculum. The final task in this section is, therefore, to develop a view of who in the system should be seen as involved in the change process.

The nature of curriculum

It is now widely recognized that it is not sufficient simply to equate curriculum with "that which should be taught". Stenhouse suggested the existence of at least two views of the curriculum: "on the one hand the curriculum is seen as an intention, plan or prescription ... On the other it is seen as the existing state of affairs in schools" (Stenhouse, 1975, p.2). Taylor (1979, p.ix) describes the intentions etc. as *prescriptive* questions which extend to issues of what should be taught, to whom, and with what intentions. He contrasts these with *descriptive* questions relating to the putting into practice of the intentions. Some aspects of such questions have already been discussed with regard to subjects in general and technology in particular in the previous chapter, and the nature of the encounter between a newly-prescribed intended curriculum and an existing curriculum is at the heart of this thesis. Weston (1979, p.28) similarly distinguishes between the intended and actual curriculum but finds, importantly for my thesis, that the description "intended" begs the question of *whose* intentions. In the case of national curriculum technology, intentions can be ascribed to the Secretary of State, the working group and the National Curriculum Council simply in the production of the Order: before there is any encounter with the intentions of a school, department or individual teacher. The previous chapter summarized the intentions for D&T as the outcome of a politically-influenced process responding to the opinions of interest groups: that outcome being represented in a nationally-applicable statutory Order. The second hypothesis indicated the difficult and controversial nature of this task at national level. In Weston's terms this Order is an intended curriculum. The case study upon which this thesis is based considers the process whereby teachers had to determine their own teaching intentions by interpreting those in the Order.

Jenkins and Shipman (1976) suggest a timeline for curriculum: "beginning in intentions, being put into practice, and typically giving rise to learning and other consequences, many of which, hopefully, will have been anticipated" (Jenkins and Shipman, 1976, p.5). This is a useful insight linking *intentions* with *outcomes*, suggesting the need for a sensible timescale for implementation (and, indeed, for any investigation into this). However, the

complexity of the processes within this timeline is recognized:

a curriculum is concerned with prerequisites (antecedents, intentions), with transactions (what actually goes on in classrooms as the essential meanings are negotiated between teachers and taught, and worthwhile activities undertaken), and with outcomes (the knowledge and skill acquired by students, attitude changes, intended and unintended side effects, etc.) (Jenkins and Shipman, 1976, p.5).

Here, the authors are drawing on the work of Stake (1967) which points out that the achievement of curricular intentions by teachers working with pupils is not a straightforward task. My thesis is concerned primarily with how the new intentions encapsulated in a statutory Order were interpreted by teachers in the light of the fact that they are already putting an existing set of intentions into practice - these present intentions being rooted in the practice and understandings of an existing subject community (BS, CDT, HE, etc.). My focus is on understanding the change process that *teachers* experience when a new curricular requirement is introduced - teachers being the ultimate interpreters of curricular requirements for their pupils. A part of that understanding is achieved by analyzing teachers' reflections on how the new intentions relate to their existing subject practice, but the purpose of that analysis is to shed light on teachers' responses to change rather than on pupils' experiences. Therefore, I am *not* focusing *primarily* on transactions and negotiations between teachers and pupils. I am, however, recognizing the importance within the change process of what Weston (1979, p.34) describes as "**curriculum-in-action**" - the essential dynamic that teachers are part of in putting curriculum intentions into practice. For this to be understood, Weston believes that:

It becomes essential to know from the inside how [the] classroom works if we are to describe or understand its curriculum. We need to know who takes part, *their beliefs about the purpose of their work*, the 'tools' and resources they are given, the way their activities and relationships are structured (Weston, 1979, p.35, my italics).

It is the need to understand - from the point of view of teachers - this aspect of curriculum

that leads me to believe that a requirement to change the curriculum must be grounded in an understanding of the practice of subject teachers. So I certainly want to focus on the *teacher* doing the job in the classroom (even if I am not concerned about the details of the interaction with pupils), and shall explore the nature of that job as carried out in the context of a department in a school generally in section 3.4, and then specifically in the case study.

The foregoing discussion suggests that there is far more to establishing a new curriculum than specifying nationally "that which should be taught" and expecting teachers unproblematically to engage in its implementation. In the case of the national curriculum, the motivation for change came from outside the teaching profession, requiring teachers to respond to other people's requirements. That this is a reasonable expectation on teachers, provided they can be enabled to engage in the change with reasonable support, can be established by addressing the following questions of the sources of educational change in general, and curriculum change in particular, and who is involved in the change process. Each of these questions will be considered in turn in the remainder of this section.

The sources of educational change

A publically-funded state education system is on the one hand an integral part of the society that contains it but on the other hand a part having distinctive functions required of it by that society. The relationship between an education system and its containing society is complex and debatable (as revealed, for example, in such collections as Dale, Esland, Fergusson and MacDonald, 1981), raising the possibility of a whole range of aims and motivations for schooling, Fullan suggests that:

there are at least two major purposes to schooling: to educate students in various academic or cognitive skills and knowledge, and to educate students in the development of individual and social skills and knowledge necessary to function occupationally and sociopolitically in society (Fullan, 1991, p.14).

This is consistent with the discussion in Chapter 2 about the reasons for including subjects or aspects of subjects in the curriculum, and shows scope for differences of opinion between groups favouring one purpose rather than another. If society changes, however, the argument that such change requires a response within the education system is a powerful one. Fullan (1982, p.24) takes as a starting point for his discussion of educational change the accounts of writers in the 1970s (e.g. Toffler, 1970; Schon, 1971) who perceived the onset of deep changes in society in general. The government's view about the *outcome* of education in the 1985 White Paper *Better Schools* that preceded the ERA was that:

What is achieved by those who provide it, and by the pupils for whom it is provided, has lasting effects on the prosperity and well-being of each individual citizen and the whole nation (DES/WO, 1985b, p.1).

It should be noted that the government's underpinning axiom, linking national prosperity with quality of education, is not above challenge. Weiner (1981), for example, suggests that the decline in this country's industrial performance is culturally rooted, rather than being simply the product of deficient education. It relates to the attitude to industry and those working in it mentioned in Chapter 2 in the context of technical education (pp.26-29). The debate on this subject is not new. Thirty years ago, when the argument about national prosperity depending on education was being applied in the USA, Taba compared the situation in the late 1950s with that of the 1890s, observing:

Today, as then, there is a deep faith in the power of education, a sense of 'inextricable relationship between education and national progress' (Cremin, 1957, p.8) and a deep disappointment in schools as instruments of that progress. Today, perhaps more than in the 1890s, education supplies the arena for debating the fundamental predicaments of society (Taba, 1962, pp.1-2).

Despite such reservations about over-simple causal relationships, the view of the government that introduced the 1988 Education Act remained firmly with education as a key instrument of national progress. This provided governmental motivation for pushing

ahead with curricular reforms that were just one part of a whole package intended to improve education and enabled by the 1988 Education Reform Act.

The government that produced *Better Schools* was quite clear about the need of *schools* (as one part of the education system) to respond to changes:

What is expected of schools alters over time with changes in society and in national circumstances ... two trends in particular can be identified since the Education Act 1944 came into force. First, economic, social and demographic changes have profoundly altered the circumstances under which schools have to do their work. Britain's place in the world has changed ... British society has become more complex and diverse; values and institutions are increasingly called into question; the pace of technological change has quickened; and unemployment has added to the pressures of a daily life which has become more precarious and sometimes more turbulent. Second, the schools have been expected to expand the range of their tasks, as a result of the transformation of their material and moral environment (DES/WO, 1985b, p.1).

This comprises a powerful argument that schools need to respond to the changing context and needs of society. These are typical motivations for change felt at the level of government: pressure often being brought to bear by interest groups such as employers and parents and political pressure groups. In England and Wales, in the period since the 1944 Education Act, such changes in schools demanding response at the level of the whole system have included raising the school leaving age, the replacement of the tripartite secondary arrangement with comprehensive schools, and the changing of practices in response to equal opportunities legislation. The ability to be aware of changes in society at national level suggests that those politicians charged with oversight of the education system should have the means of initiating change of various kinds that is responsive to perceived needs. The *curriculum* is a particularly sensitive area for teachers, because the implementation of curricular requirements affects the key interaction (the transactions and negotiations of Jenkins and Shipman (p.75)) between subject teachers and their pupils. Therefore, having recognized that the education system in general is reasonably expected

to respond to changes in society, a particular question that has to be addressed is that of where control of the intended curriculum should lie. If teachers are to implement someone else's changes to the curriculum, they might reasonably be expected to be shown that such changes are appropriate, desirable and legitimate.

The sources of curriculum change

Waring (1979) notes that

pressures for curriculum change at any given time may be rooted in one of several areas as, for example, ideology, politics, economics, or professional knowledge or theory (Waring, 1979, p.8).

In the case I am studying, the starting point for the particular changes was a political decision external to the education system. Part of that decision was to establish a national specification for the subject curriculum within a general desire to raise educational standards. This political interest suggests that, even taking the restricted view of the curriculum as that which should be taught, decisions are subject to interest groups remote from schools and classrooms. A concept used by Becher and Maclure (1978), and useful in a discussion of a publically-funded education system, is that of the **public curriculum**, which they define as "those aspects of the curriculum which embody an education system's shared assumptions, however formulated, about the main things which pupils should do and learn at school" (Becher and Maclure, 1978, p.16). It is, therefore, about curricular intentions, and they see it as having two main features:

The first is that the curriculum embodies rational intentions - it is a means to an end, even if the end is not analyzed with any rigour, and is usually taken for granted within the familiar dimensions of an educational tradition. The second is that, as a social phenomenon, the curriculum is not to be regarded as so individual as to be devoid of any collective intent: there are, in fact, aspects of the curriculum which are intended to be shared, and about which collective decisions have to be taken (Becher and Maclure, 1978, p.16).

The concept of collective intent confirms a wider constituency of interest in what is taught than just teachers and pupils. It was the Conservative Minister for Education Sir David Eccles who, in a 1960 parliamentary debate on the Crowther Report (1959), applied the epithet "secret garden" to the curriculum: implying a view that here was an area that was too much the preserve of the teachers. When Becher and Maclure were writing in 1978 - at a pivotal moment between Callaghan's 1976 speech and the arrival in 1979 of a new, tenacious and interventionist government that did not intend taking for granted any of the "familiar dimensions" of the education tradition - they noted that:

Responsibility for the curriculum - a term the [1944] Act used in its narrow sense^[2] - was vested in the local education authorities ... In practice, however, decisions about the curriculum are taken by teaching staff at the level of the individual school [and are] ... normally regarded as wholly within the professional discretion of the head and his [*sic*] staff (Becher and Maclure, 1978, p.35).

Despite the notional freedom identified by Becher and Maclure, headteachers had limited scope for changing the curriculum (unless they were highly innovative and had political allies) because of external constraints imposed by employers, examinations and higher education, and the expectations of parents and governors. Waring noted that:

in the first place, the law requires that what goes on in schools be acceptable to parents and related to the ages and abilities of the pupils. In the second, many other individuals and institutions, such as HM Inspectors, head teachers, parents, governors, examining boards and, through entrance requirements, universities, have power which enables them to facilitate or to constrain attempts at change (Waring, 1979, p.10).

Some I.e.a.'s and schools, possibly at the instigation of a charismatic individual, did bring innovative subjects to the curriculum (for example, the introduction of Design in Leicestershire - Dodd, 1978, p.42). Within this overall context, the Schools' Council was

² The sense of "that which should be taught".

(between 1964 and 1984) a significant stimulus to curriculum development projects but always recognized the autonomous nature of schools each "with its own curriculum and teaching methods based on the needs of its own pupils and evolved by its own staff" (Schools Council, 1965, p.34).

Ball (1990) traces a developing struggle over control of the curriculum from the time of the "Black Papers" (first published 1969), through to the teachers' action of 1985-86. He observes that by the mid 1980s:

the 'failings' of teachers have provided justification for much greater direct intervention into school processes by LEAs, the DES, HMI, the Secretary of State for Education, and other agencies like the MSC.³ Arguably, the education service has begun to move back towards the form of centralized control which existed until the late 1920s. Dale (1979) conceptualizes this move in terms of a shift in the relative autonomy of schools from 'licensed autonomy' to 'regulated autonomy' (Ball, 1990, p.249).

Ball agrees with Dale that the change had reduced the freedom of manoeuvre of teachers, rather than removed their autonomy altogether.

In 1985, through *Better Schools*, the government indicated that a broad and balanced curriculum was needed within which the various subjects and their contributions would need to be a matter of policy, based on discussions such as those contained in (then) current and forthcoming HMI documents. The government's perspective in *Better Schools* was that it wanted to establish national objectives for the curriculum which would become "the basis of the curricular policies of the Secretaries of State, the LEAs and the schools" (DES/WO, 1985a, p.10). This was moving strongly in the direction of taking direct responsibility for establishing features of the curriculum, and it is clear that the national curriculum intentions, from 1987 onwards, have moved towards a centralized prescription

³ The Manpower Services Commission, as it then was, originated The Technical and Vocational Education Initiative (TVEI) which was a major curriculum initiative that circumvented conventional channels and involved schools and I.e.s in binding contractual agreements about curriculum implementation in exchange for funding.

of pupils' programmes. Moon (1989, pp.223-226) draws attention to the "radical change of policy" regarding the curriculum that took place between 1985 and 1987. He notes that, whereas "The curriculum statements of *Better Schools* represented the evolving consensus about a non-statutory framework based around the HMI formulation of areas of curriculum experience", after the general election of 1986, "A group of ministerial, or Prime Ministerial, advisers took the opportunity to gain influence. Many were associated with right wing 'think tanks' ... A decentralised structure of decision making had ... become centralised almost overnight" (Moon, 1989, p.223, 224).

It is worth noting the strength and direction of feeling of one member of what Moon describes as a "right wing think tank". Lawlor observes:

The national curriculum proposed in the new Education Reform Bill [as it then was] presents an opportunity for change but the danger exists that far from tackling the orthodoxies, it will further entrench them. If the content of the proposed national curriculum merely reflects the views of members of the 'education service' - teachers, their unions, LEAs, education theorists and worst of all Her Majesty's Inspectorate - then the national curriculum, instead of serving to raise standards, will lower them (Lawlor, 1989, p.58).

She goes on to state her view that children need to be taught hard facts, rather than engaged in learning experiences: a view that is at the centre of many debates about the prescription of national curriculum subjects, and that impinges significantly on the nature of D&T. What is particularly clear is the dismissive attitude to the 'education service' - not just implying shortcomings on the part of teachers, but on the part of the whole system.

The foregoing discussion suggests that people outside and at a range of levels inside the education system should be able to initiate the process of curriculum change. There is a body of opinion, currently typified by Rudduck (e.g. 1991a), that maintains that significant curriculum change can only be achieved when it is initiated and owned by teachers. That view reduces the right of other parties to be interested in the initiation of change, and also runs the risk of a limited perspective. Becher and Maclure suggested the existence of and

need for a consensus about the curriculum between interest groups. The alternative to consensus is conflict. Tipping the balance of a consensus too much either way (towards or away from teachers, in this case) moves the situation towards conflict. In the case of the national curriculum, the government continued to disturb the consensus about the curriculum,⁴ putting the educational system into responsive mode. A difficulty with responses in a conflict situation is that they tend to be represented as reaction, rather than as genuine debate. That is an issue that has to be accepted as part of the present case of planned change. Fullan (1991) accepts the right of politicians to initiate change, but observes that

innovations get generated through a mixture of political and educational motives. Writ large, educational reform is very much a political process (see Sarason, 1990) ... Politically motivated change is accompanied by greater commitment of leaders, the power of new ideas, and additional resources; but it also produces overload, unrealistic timelines, uncoordinated demands, simplistic solutions, misdirected efforts, inconsistencies, and underestimation of what it takes to bring about reform. If one is on the receiving end, as nearly all of us are, the main piece of advice is *caveat implementer* (Fullan, 1991, p.27).

The warning here is that politicians simply do not recognize the implications for implementers of their plans for change: an issue which I shall return to when considering change strategies. Whilst teachers do have to respond to (sometimes unrealistic) changes required by those beyond the classroom, they do have professional support structures within the education system. In the next section, the question as to *who* is involved in the change process will on the one hand establish who may be able to help teachers in the implementation of change, but on the other hand it will identify people at different levels in the system who will find themselves needing to respond to change. In the case of a curriculum specified at national level through statutory Order, people at each of these levels will have to interpret the Order in the light of their own current understandings - an

⁴ The TVEI initiative had already disturbed the consensus.

important point that will be taken up in section 3.3.

Who is involved in the change process?

Until the mid 1980s, the involvement of people at various levels in the education system in curricular provision was essentially as laid down in the 1944 Education Act. Within this the government recognized different levels as having different responsibilities for the provision of the curriculum. For example, in identifying the separate roles in the development of curriculum policy of Secretary of State, l.e.a. and school, *Better Schools* states that:

Curricular policy at each of these three levels would ... be directed towards the same objectives. But the application of the objectives is different at each level because the functions of the Secretaries of State, the LEA and the school, though interrelated, are separate from each other, and are exercised over a progressively more limited geographical area (DES/WO, 1985b, p.10).

The division of responsibility and the need for a policy for the curriculum at each level is then outlined as follows. The Secretary of State has a responsibility not only for the provision of appropriate education nationally, but for supply and training of teachers. The l.e.a's curricular policy informs its functions "in relation to such matters as the provision of schools, the deployment of its teaching force and its *advisory service*" (DES/WO, 1985b, p.10, my italics). The school's curricular policy "informs the organisation and delivery of what is offered to pupils" (DES/WO, 1985b, p.10). A subsequent paragraph states that:

it would not be appropriate for either the Secretaries of State or the LEA to determine the detailed organization and content of the programme of the pupils of any individual school. This should be a matter for the headteacher and his (*sic*) staff ... it would not in the view of the Government be right for the Secretaries of State's policy for the range and pattern of the 5-16 curriculum to amount to the determination of national syllabuses for that period ... it would however be appropriate for the curricular policy of the LEA ... to be more precise about, for example, the balance between curricular elements and the age and pace at which pupils are introduced to

particular subject areas. Within the authority, the curricular policy of each school would reflect the policy of the LEA ... but would develop, in the detail needed for the work of the school, the strategies by which the school intended to secure an appropriate curricular range and pattern in the programmes of its pupils. Such strategies would reflect the school's own priorities in accordance with its traditions, its ethos and its view of the needs of its pupils in the light of parental and other expectations (DES/WO, 1985b, p.11).

Despite some moves (such as the introduction of the TVEI) to change the balance of this situation, and the increasingly prevalent opinions such as Lawlor's about the influence of people in the system, the preceding paragraph describes the education system familiar to those working in it in the early 1980s. Whilst the Secretary of State and L.e.a's had a responsibility to support the teaching of the curriculum, it was schools and teachers that had the main responsibility in determining what to teach and how to teach it.

It is appropriate that people at different levels in the education system should bring particular expertise to bear in exercising complementary responsibilities for the curriculum. In the 1960s in the USA, Hilda Taba (working in "grassroots" curriculum development projects which sought considerable involvement of teachers) had reservations about trying to involve everyone who might have an opinion about the curriculum:

The basic argument that, unless those who are using the curriculum have some part in determining it, they will resist any change, is sound. But this is far from saying that everyone affected by the curriculum must also take part in every decision ... Teachers are expected to make decisions which require theoretical insights into curriculum even though they do not have such insights (Taba, 1962, p.451, 452).

She drew a salutary point from the grass-roots model, that "Much grief has come from an indiscriminate participation of everyone in everything" (Taba, 1962, p.452). This led her to declare that "the decisions on participation must rest on who can best do what, and not on a sentimental concept of democratic participation" (Taba, 1962, p.452). That point, drawn from her own practical experience of curriculum development, acknowledges that

there is little point in having an education *system* if people at the various levels of the system are not seen as having discrete but complementary functions. So she was quite clear that different tasks were appropriately carried out by suitably-qualified people at different levels.

In this country, subject communities have had a range of members engaged in curricular decisions. As well as subject teachers, l.e.a. advisory staff have been significant members of subject communities, as have members of university departments and other providers of initial and in-service training. The evidence that I shall present in the case study is that when national curriculum subjects were first being introduced, the expectation in schools was that l.e.a. advisory staff (or other advisors from beyond the school) ought to be available to be involved with teachers in the process of subject-based change. Those teachers who had experienced curriculum change in the past had usually met it within their own subject, so departments and subject communities including l.e.a. advisory staff were important.⁵ As I will show, the implementation of D&T required cooperation between subject departments in schools, but the debates and reorientations needed at school level also needed to take place within l.e.a. advisory structures which were based on the previous subject model (BS, CDT, HE, etc.). Advisory staff and others involved in teacher support were responding to the required changes within the same time-scale and from largely the same understandings as the teachers they were attempting to support.

I noted in Chapter 1 how various appeals have been made to pay attention to the process of curriculum change as it happens at school level - the place where a new intention interacts with curriculum-in-action. From his reflection on forty years of curriculum change Fullan makes an appeal that:

in understanding and in coping with educational change it is essential to

⁵ At the very time when support was needed, the government seemed intent on decreasing the role of the l.e.a.'s. The *TES* of 5th March 1993 stated that a new clause in the current Education Bill 'centralizes power and writes local authorities out of the role given to them in the 1944 Act' (*TES*, 5-3-93, p.4).

find out what is happening at the classroom, school, and local levels of education as well as at the regional and national levels. Neither set of levels can be understood in isolation from the others (Fullan, 1991, p.16).

He further notes that "the school is the center of change, and that is where focus, coherence and consistency must be forged" (Fullan, 1991, p.168). Rudduck (1991a) quotes a 1989 speech by Goodlad as reiterating that "the important concerns of educational research are, first, to understand schools and, secondly, to change them. You cannot do much of the second without the first" (Rudduck, 1991a, p.89). The point about needing to understand schools in order to effect change applies equally when the motivation for change comes from the political, rather than the educational arena. McCormick (1992a), writing about curriculum change in the area of Information Technology draws attention to the need to focus on the school because "change that does not address the issues faced by a school will fail to have any profound impact" (McCormick, 1992a, p.27). It is because of the strength of these arguments which draw on a growing body of research that I am paying particular attention in this thesis to the response of individual teachers in the context of a particular school. Also, because secondary school teaching is done through subject departments, linked strongly with the subjects as investigated in the previous chapter, I am considering the role of departments in the change process.

Moving to the level of the individual in the system, Hargreaves and Fullan (1992) argue as follows for attention to be paid to the teacher:

we have come to realize in recent years that the teacher is the ultimate key to educational change and school improvement. The restructuring of schools, the composition of national and provincial curricula, the development of bench-mark assessments - all these things are of little value if they do not take the teacher into account. Teachers don't merely deliver the curriculum. They develop it, define it and reinterpret it too. It is what teachers think, what teachers believe and what teachers do at the level of the classroom that ultimately shapes the kind of learning that young people get (Hargreaves and Fullan, 1992, p.ix).

This links into the change process important aspects of how and why teachers do their job.

It is within my thesis that the way in which teachers necessarily function as teachers affects, and has to be accounted for within, any sensible attempt to bring about change. Later in this chapter, I shall consider the nature of schools, departments and teachers as they may affect the change process.

This section on curriculum has introduced the difference between the curriculum as an intention and as curriculum-in-action. It has been recognized that people other than teachers may reasonably expect to contribute views about the intended curriculum, that curriculum being part of a system that serves society. Therefore, in considering the particular case of the implementation of D&T in a school, the expectation is that the teachers might reasonably be expected to recognize the right of others to have an interest in determining the curriculum, even though they themselves will be intimately concerned with the details of curriculum-in-action. However, it has also been recognized that a familiar balance of interest has been disturbed, which may affect teachers' responses. Significant changes are now being required of teachers with which they may reasonably expect support from the system within which they work. However, that system is itself being transformed as part of the overall climate of change that includes the introduction of the national curriculum. Therefore teachers find themselves required to change the curriculum in a situation where their familiar support structures are also changing. Having established these features of the source of the change being studied and the involvement of people in it, it is to the change process itself that I now turn.

3.3 Perspectives on the change process

My thesis argues that, although a considerable understanding of the reasons for the success or failure of planned change has developed through the study of change, the government has not adequately paid attention to this understanding in attempting to establish its national curriculum. In order to develop this argument, in this section I shall introduce some general perspectives on the change process. I shall then make a more detailed consideration of the nature of schools, departments and teachers as they may affect the implementation locally.

Rudduck (1991a) describes as "innovation without change" the long period of attempts at planned change to the curriculum that appeared to have had little significant effect on outcomes, and had therefore exasperated some politicians and disenchanted some teachers. However, Rudduck, Fullan and others (e.g. Sarason, 1982; Huberman, 1989) recognize that some attempts at change have been effective, and propose views about what works and why. In particular there is a view that, whilst large-scale, politically-visible changes may not be apparent, there has been considerable change in practice at classroom level. Thus Rudduck, reflecting on the education system's "capacity for continuity and stability in the face of efforts to change" (House, 1979, p.9) observes that:

At one level this judgement [about resistance to change] is reasonable; at another it is not. It is strong on the system perspective ... but weak on the teacher perspective for it ignores the numerous small change efforts that teachers successfully make, on a regular basis, for their own pupils, in their own area of the curriculum (Rudduck, 1991b, p.125).

In particular, Rudduck draws attention to Huberman's (1989) concept of **tinkering**:

An important category in [Huberman's] analysis was "teachers who invested consistently in classroom-led experiments: in what they called tinkering - with new materials, different pupil groupings, small changes in grading systems". Thus, while commentators looking at the broad outlines of schooling see a stability, the everyday experiences of individual teachers tell a story of the myriad surfaces of teaching and learning that are flickering with change (Rudduck, 1991b, p.125).

Tinkering is not to be lightly dismissed. Rather, it is the key to effective teaching because it is the reflective fine tuning that teachers do in response to the way their own intended activities work out in practice. Change at this level can only be carried out as part of curriculum-in-action, and cannot be within the realm of national committees and their prescriptions. This contrast between small-scale and large-scale change is an important one which I shall take up in the case study. However, the background of perceived problems on the part of those seeking outcomes from large-scale planned changes cannot be ignored. I shall make use of three perspectives on change that shed light on the implementation of

curriculum change at school level. The first perspective has been developed by Fullan (1982, 1991) who maintains that all those involved in the change process need to be able to **construct their own meaning** for a required change if they are effectively to carry it out. The second perspective comes from the work of Chin and Benne (1976) in the context of achieving planned change in human systems, who identify the significant characteristics of various **change strategies**. The third perspective considers aspects of **human interactions** as they happen in schools and departments. I shall consider these in turn, and make suggestions as to how they interact when applied to the implementation of curriculum change in a secondary school.

The construction of meaning

In reflecting on the successes and failures of a wide range of curriculum projects, Fullan has concluded that the evidence points in a particular direction. His main work, distilled into his recent books, is expressed as follows:

Implicit in discussions of educational reform, but rarely recognized, is the confusion between the terms *change* and *progress*. Resisting certain changes may be more progressive than adopting them, but how do we know? The key to understanding the worth of particular changes, or to achieving desired changes, concerns what I call "the problem of meaning". One of the most fundamental problems in education today is that people do not have a clear, coherent sense of *meaning* about what educational change is for, what it is, and how it proceeds. Thus, there is much faddism, superficiality, confusion, failure of change programs, unwarranted and misdirected resistance, and misunderstood reform. What we need is a more coherent picture that people who are involved in or affected by educational change can use to *make* sense of what they and others are doing (Fullan, 1991, p.4).

Such a view argues for a balance between perspectives from schools and elsewhere: the danger of a tipping of the balance of consensus too far is that there is no check on the opinions and decisions of the group doing the tipping. Fullan goes on to suggest that the making sense has two interconnected aspects. The first is the subjective construction of

meaning by individual practitioners directly involved in change at all levels of the education system. The second is the overall construction of meaning of the sociopolitical processes of educational change. Regarding the first, it is a central tenet of my thesis, supported by evidence to be presented from the case study, that a key problem confronting the teachers required to implement D&T was that of constructing meaning for the statutory Order from the basis of their existing subject experience. In the previous chapter I suggested that a lack of clarity in understanding the areas of technology in the world, in the curriculum, and its pedagogy, all contributed to the difficulty of specifying the subject. In Fullan's terms, this lack of clarity inhibited the building of a coherent picture. The following chapters of this thesis show how this difficulty transferred to school, department and teacher levels in the struggle to construct some kind of meaning from the statutory Order. Regarding the second of Fullan's aspects of making sense, this thesis is precisely an attempt to understand one example of educational change by paying attention to sociopolitical processes.

Fullan also draws attention to the need within the overall process for the nature of both the *what* and *how* of change to be addressed, observing that one without the other is of little use:

on the one hand we need to keep in mind the values and goals and the consequences associated with specific educational changes; and on the other hand, we need to comprehend the dynamics of educational change as a sociopolitical process involving all kinds of individual, classroom, school, local, regional, and national factors at work in interactive ways. The problem of meaning is one of how those involved in change can come to understand what it is that should change and how it can best be accomplished, while realizing that the what and how constantly interact and reshape each other ... We are not only dealing with a moving and changing target; we are also playing this out in social settings. Solutions must come through the development of *shared meaning*. The interface between individual and collective meaning and action in everyday situations is where change stands or falls (Fullan, 1991, p.5).

In the case under study here, the requirements of the technology Order represent the

"what" of the new intended curriculum at national level. A first requirement of successful implementation is that these shall be clearly set out. Chapter 2 showed that, although a statutory Order was produced, this did not necessarily imply that there had been an effective sharing of meaning between interest groups. Although the technology Order may have had meaning for the person(s) drawing it up in its final form, the controversy and comments arising on its publication imply that meaning was not shared at this stage even with the members of the original working group. From this debatable "what" at national level, there had to be derived curriculum intentions at school, department and individual teacher level. Translating a national "what" to a local "what" involves negotiation and construction of meaning between interest groups at school and departmental levels. The "how" refers to the need for an implementation strategy that recognizes the "dynamics of educational change". It is to be expected that those requiring the change will have such a strategy: what is less clear is whether or not it will be a strategy that addresses the needs of those faced with implementing the change. As well as an overall national strategy accompanying a change required at national level, the need for a strategy also transfers to each school and each department. The question "how" needs elaborating at each of these levels.

The earlier discussion on who is involved in the curriculum change process recognized that, in this instance, people at the level of i.e.a., school, department and individual classroom would all be involved. Recognizing different levels at which there is an interest in curriculum *intentions* links with Fullan's perspective on meaning to suggest that there will be different agendas in operation and *different understandings*. This is compounded in the case of D&T where several subjects are involved. Even in the narrow area of curriculum prescription there is scope for variation and dispute as people bring their own understandings to bear in deriving their own intentions from the stated intentions of others. Rudduck (1991a, p.30) draws attention to the need to build shared meaning in a situation where change is required: confirming a concept that is central to Fullan's work of the last decade. Weston (1979, p.32) refers to curriculum bargaining or negotiation within her concept of curriculum-in-action. Curriculum negotiation is the practical process of

discussion between groups or individuals who have constructed particular and different meanings for curricular matters from their own perspective. They all have opinions about what should be taught, to whom, by whom and how. This means that these people will criticize the others from their own standpoint and will have to be convinced about the validity of the change requirement as they perceive it.

I have previously claimed that change can sensibly be initiated by various people with an interest in education: the implication being that teachers should reasonably be expected to implement change if so required. Whereas Rudduck (1991a) tends to follow Stenhouse (1975) in arguing that curriculum change should be initiated by teachers, Fullan is less concerned with the source of a change than in asking what he calls the "capacity for implementation" question: "how sound or feasible are the idea and approach?" (Fullan, 1991, p.17). I shall reflect on the soundness and feasibility of the intentions for D&T partly in this chapter, and partly in the final chapter. To enable that final analysis I introduce here a further aspect of Fullan's work that provides a means of characterizing the overall outcome of a planned change. Fullan suggests that there are four possible outcomes for the implementation of a proposed change, as summarized in Figure 3.1 below.

		Actual implementation of the change	
		YES	NO
Value and technical quality of the change	YES	I	II
	NO	III	IV

Figure 3.1 Outcomes of a proposed change as conceptualized by Fullan.

His description of the grid is as follows:

"Actual implementation" [of the change] refers to whether or not there has been a real change in practice. "Value and technical quality" [represents] who benefits and whether or not the program has been technically well developed ... Type I represents ... the actual implementation of a quality program that we value. Type II reflects a planning problem in that a valued, technically sound program is not being implemented for certain reasons ... In type III a change that is not technically well developed or is not well valued ... is being put into practice. In short, a bad change is being introduced ... In type IV ... a poorly valued or poorly developed change is being rejected in practice (Fullan, 1991, p.18).

Fullan notes one possible consequence for the teacher: "painful unclarity is experienced when unclear innovations are attempted under conditions that do not support the development of the subjective meaning of the change (Fullan, 1991, p.35)". I shall use this categorization of the outcome of change in the final chapter.

Fullan's work, based on much experience of involvement in and reflection on planned change, has provided a useful perspective on what is needed to support people involved in change. I turn now to the second perspective which complements this first - that of the overall nature of change strategies.

Strategies for achieving planned change

Fullan's recent perspective on educational change links usefully with an earlier perspective on strategies for planned change in social systems in general, suggested by Chin and Benne (1976), related to the educational context by McCormick and James (1988), and identified of importance in the curriculum change situation where interest groups are involved by McCormick (1992b). There are three kinds of change strategy - **empirical-rational**, **normative-re-educative** and **power-coercive** - each having its own characteristics and a particular view of human behaviour. The essential feature of an empirical-rational strategy is that it assumes that human behaviour is rational, and that

humans will "follow their rational self-interest once this is revealed to them" (Chin and Benne, 1976, p.23). Further:

A change is proposed by some person or group which knows of a situation that is desirable, effective, and in line with the self-interest of the person, group, organization or community which will be affected by the change. Because the person (or group) is assumed to be rational and moved by self-interests, it is assumed that he (*sic*) (or they) will adopt the proposed change if it can be rationally justified and if it can be shown by the proposer(s) that he (or they) will gain by the change (Chin and Benne, 1976, p.23).

Normative-re-educative strategies contain a different view of human behaviour which does not deny human rationality and intelligence, but recognizes that:

Patterns of action and practice are supported by sociocultural norms and by commitments on the part of individuals to these norms. Sociocultural norms are supported by the attitude and value systems of individuals - normative outlooks which undergird their commitments. Change in a pattern of practice or action, according to this view, will occur only as the persons involved are brought to change their normative orientations to old patterns and develop commitments to new ones. And changes in normative orientations involve changes in attitudes, values, skills, and significant relationships, not just changes in knowledge, information, or intellectual rationales for action and practice (Chin and Benne, 1976, p.23).

The third kind of strategy, power-coercive, is based on the application of political or other power.

The influence process involved is basically that of compliance of those with less power to the plans, directions, and leadership of those with greater power ... the strategy may involve getting the authority of law or administrative policy behind the change to be effected (Chin and Benne, 1976, pp.23-24).

Several points emerge as being of immediate relevance to the specification and planned implementation of D&T as outlined at national level in Chapter 2 and for its implementation at school level as will be described in Chapters 4 to 7. The government has

adopted an overall power-coercive strategy in bringing the national curriculum into schools with the backing of the law. Thus, the nature of D&T and the timetable for its introduction as laid out in the statutory Order (DES/WO, 1990) are legally binding, requiring the compliance of teachers. What has been described in Chapter 2 as the interactions of interest groups having various "normative outlooks which undergird their commitments" suggests the need to play close heed to the requirements of a normative-re-educative strategy for implementation. A newly-imposed curriculum is not necessarily in the self-interest of teachers, so any expectation that a rational approach to change within an overall power-coercive approach will bring about effective implementation is open to question.

Contained in the strategies are views about human response to change. In the case of curriculum change at secondary level, the basic unit within which this has to take place is a department in a school. For that reason, the third way of illuminating the change process focuses attention on the way that individuals and groups interact.

Perspectives on human interactions

Two perspectives are outlined in this section. The first, from Ball (1990) who calls for particular attention to be paid to micro-political interactions in schools. The second, from Handy (1980) and Adair (1987), is a particular characterization of the way groups of people work together. These perspectives are consistent with the overall picture I am developing of the need to recognize that individuals need to construct meaning for change as they interact both as individuals and interest groups. They focus on particular details within this overall picture, and are of particular value in looking at the interactions at local level within the overall large-scale change.

Ball (1990) builds a case for a micro-political perspective on change by considering the previously-identified forty-year period of attempts at planned change to the curriculum. His view is that whereas previous change strategies have assumed that "change is ... something that is done *to* people and *to* organizations" (Ball, 1990, p.31), a micro-political

perspective:

ultimately rests upon taking seriously the active interpretational responses of the actors in the organization and thus involves abandoning the positivist/materialist conception of innovation which is central to [rational] ... change traditions. This alternative conception also places innovation within the interactive/political arena of the organization (Ball, 1990, p.31).

Ball's perspective draws attention to the fact that change does not arrive into a vacuum, but into an active situation where human interactions take place in a context (school, department, classroom) where those involved have a previously-constructed meaning for what is going on. It therefore points to the importance of taking seriously the need for a normative-re-educative strategy. In section 3.4 I shall consider in more detail the school and the department as levels at which micro-politics occur.

The second perspective comes from popular management studies (e.g. Handy, 1980; Adair, 1987) that identify aspects of the behaviour of groups as the people working in them come to terms with a particular task. It acknowledges that people will not easily give up their familiar meaning structures. For example, Adair (1987, pp.27-30) suggests that newly-formed groups (and I would include groups of teachers required to cooperate in teaching D&T in this category) go through phases of **forming, storming, norming and performing**. The forming phase is characterized by considerable anxiety on the part of the members as the group's task is clarified and the rules of encounter are established. Storming is a period when conflict emerges between different interest groups, authority is challenged and opinions tend to polarize. The value and feasibility of the task is questioned, and there is emotional reaction on the part of various individuals. Norming occurs as the group begins to harmonize and cooperate on tasks. Communication of views and feelings develops. In performing, the group adopts a structure which best suits it to fulfilling its task, and energy is focussed on that task. Adair notes that, like all descriptive models, this has its limitations: not least that the stages may not be consecutive and may overlap. However, it is a perspective on group behaviour that sits comfortably with the concept of the need for people to come to terms with a new situation from an existing

structure of work and meaning. It is appropriate for a newly-formed department such as suggested as a possibility for the implementation of D&T. It also suggests that conflict and consensus as previously discussed are phases rather than continuing states.

The perspectives outlined above (from Fullan, Chin and Benne, Ball, Handy and Adair) will be brought to bear, along with the insights from Chapter 2 into the nature of subjects, in the analysis of the case study in the following chapters. First, however, the developing pattern of understanding about the limitations of certain change strategies will be demonstrated in a brief historical perspective. The evidence thus presented reinforces the need to pay careful attention to the circumstances of the teachers who are the ultimate interpreters of curricular intentions, by showing that this need has long been recognized and transcends the particularities of individual education systems and approaches to change.

Reflecting on forty years of planned change

In the USA in the early 1960s the so-called scientific or rational paradigm for curriculum development (both its planning and its implementation) was in full flight. Curricula were to be developed from behavioural objectives and implemented through committee structures. In presenting her own strategy for the implementation of curriculum change within this context, Taba (1962) reflected on problems with a "top down" strategy in which several layers of committees and working groups generated material that was finally offered to teachers through an "installation committee". The aim was the production of courses of study, and Taba's main observation on this strategy was that it:

yielded many publications but did not always achieve a corresponding impact on the classrooms, because the changes in curriculum were not accompanied by changes in the skills and attitudes of teaching personnel. Nor were these paper plans sufficient guide to implementation. Since a small group conceived, initiated, and directed the change, the changes did not reach the fundamental arena for curriculum change, the classroom (Taba, 1962, p.447).

Acknowledging the existence of differences between educational systems, the parallel with the national curriculum process is sufficiently close to heed the warning about the need to change teachers' skills and attitudes: a clear early pointer to the need for a normative-re-educative strategy. This need is recognized by Taba, even if the means to achieve it is not. There is a strong pointer to the central importance of the need to address the classroom context. The problems are associated with a "top-down" or, (to use Schon's description borrowed by the Schools Council (1973a, p.44)) "centre-periphery" model. There is a need to address the issue of how a central group can engage those receiving the material: Weston's "negotiation" being needed to enable Fullan's "construction of meaning". The national curriculum has top-down characteristics, which suggests the need to address this problem of the implementation of paper plans, especially given the limited material offered to teachers⁶ and limited time available for implementation.⁷

Despite the relevance of such insights for the present situation, Taba was working within a rational paradigm for the planning and changing of curriculum which has been much criticized, for example by Taylor as follows:

It is easy now to see this approach to the study of the curriculum and to the solution of curriculum problems ... as a *false characterization of the setting in which the curriculum as intention and in transaction is to be found* (Taylor, 1979, p.x, my italics).

In other words, the complexity of the situation in which the curriculum has to be implemented is not acknowledged within this paradigm. Despite his reservations, Taylor did not think that the rational scientific paradigm would disappear altogether:

the most likely course of events is for the *rational approach* to the solution of curriculum problems, which the 'objectives approach' represents, will be retained by those whose interest is in *efficiency and accountability* as a

⁶ Initially the statutory Order (DES/WO, 1990) and non-statutory guidance (NSG)(NCC, 1990).

⁷ The statutory Order emerged in March 1990 requiring implementation in Y7 in September 1990.

feature of managerial and political responsibility (Taylor, 1979, p.x).

The programmes of study and statements of attainment of the national curriculum do not equate directly with Taba's behavioural objectives, but Taylor's observations on the continuance of some aspects of the rational paradigm ring true when set against current interest in accountability in the education system - not least through assessment of pupils against standard tests at the end of key stages. It raises the possibility that the people currently initiating curriculum change think within the rational paradigm, anticipating the success not only of a rationally-planned curriculum but also of a rational strategy for its implementation, especially if that strategy also exhibits elements of a power-coercive one.⁸

The criticisms of Taba's generation came from a later generation of curriculum scholars working within a different paradigm, but the influence of the rational paradigm was considerable and produced a "technological" perspective which was initially adopted by the Schools' Council in this country. The technological perspective is so called because it derived from studies by Rogers (1962) of the adoption of new agricultural practices by farmers. Within this perspective, the research, development and diffusion (RD&D) model postulated a four-stage change process involving research, development, diffusion and adoption. Olson (1980) notes simply that "changing the curriculum is not like buying a new tractor or using new seeds" (Olson, 1980, p.3). House's reservations about the RD&D model are typical:

The RD&D approach assumes ... a passive consumer at the end of the RD&D chain who will adopt the innovation ... The teacher is not passive but is actively engaged in a local complex-environment with a distinctive subculture and set of values ... Such a scheme for innovation might work if the various actors in it - researchers, developers, diffusers, teachers - shared a common value system and worked towards a common end. But they do not. Such a scheme might also work in the absence of a community of

⁸ I shall look later in this section at the evidence of the kind of overall implementation strategy envisaged for the national curriculum.

interest if someone had the power to enforce compliance among the separate roles. In the decentralized educational systems of England and America, there is no such concentrated power as yet (House, 1979, p.3).

Here is foreshadowed Ball's observation about the teacher to whom change is *done*. Here is also a recognition of the effect of interest groups, which raises questions about Becher and Maclure's concept of "collective intent" within the public curriculum: suggesting the much more likely scenario of differing perspectives and intentions. The real hope seems to be for a change strategy that acknowledges the existence of normative belief systems and that gives time and support for the construction of new meaning within a normative-re-educative strategy. House interestingly anticipates the decision to apply a power-coercive strategy. However, even within such a strategy, Fullan's "capacity for implementation" question requires that the intentions of those planning the change need to be clearly set out if the end is to be achieved.

As I have previously noted, the lack of success of curriculum development projects in general did little to encourage magnanimity on the part of the political holders of the purse-strings that had permitted the growth of the curriculum development industry. As recorded by McCormick and James (1988) and Skilbeck (1990), there was an increasing move through the 1970s and into the 1980s towards accountability through monitoring and evaluating the activities of the curriculum industry and eventually the whole education system. This indicates a tendency to take the empirical-rational approach in the direction of power-coercion, rather than in the direction of normative-re-educative strategies. The foregoing discussion exposed the weakness of empirical-rational change strategies, by indicating a depth of support from a range of perspectives for a recognition of the circumstances to be addressed by those seeking curriculum change. The evidence suggests the need to adopt a normative-re-educative strategy if teachers are to be enabled to implement curriculum change required of them. I turn now to the context in which teachers do their work, and within which changes have to be implemented. In each case I identify factors likely to affect the change process.

3.4 Schools, departments and teachers

The job of secondary school subject teaching is embedded in a departmental and school structure, which teachers use to construct meaning for their work, and through which requirements to change what is taught (in the top-down model) filter down to the teacher. Therefore, in understanding the dynamics of curriculum change, it is necessary to obtain a view of the way the working and characteristics of schools, departments and teachers can be linked in with the overall change process. This is particularly important in the case of D&T, where (as was shown in Chapter 2) its implementation would not be "in house" for any one existing subject area (BS, CDT, HE, etc.), but would require cooperation between existing subject departments and subject teachers. The purpose of this section is to establish the normative patterns (within Chin and Benne's normative-re-educative strategy) that comprise the subject teacher's meaning structure, and need addressing within a change strategy.

Schools

Schools as a *genre* represent one very significant level at which curriculum decisions are made, but each school is also a *unique* unit within which curriculum intentions are put into practice within a local context. Schools are one example of a social system which experience influences from the surrounding society. They are the discrete local unit within which curricular intentions are put into effect.

Early ethnographic case studies of schools (Hargreaves, 1967; Lacey, 1970; Ball, 1981) were all attempts to reveal, by in-depth study, the intimate workings of a school, particularly with a view to understanding the experience of certain groups of pupils. Such studies demonstrate the complexity of the school situation that has served to defeat oversimple attempts at effecting curriculum change, and have opened up large areas of life in schools which may have been thought to be unproblematic in terms of effecting change. As Westoby (1988) points out in his *Introduction* to his edited collection *Culture and Power in Educational Organizations*, a school is a complex institution which can usefully

be treated as an organization, provided that it is recognized that it is made up of people. Thus, as is suggested by Hoyle and McCormick (1976), a nomothetic perspective, which includes stable features such as departmental structure and a timetable, needs to be balanced by an idiographic perspective, which acknowledges the quite individual way in which people do their job. When investigating the curriculum and its change processes at school level, Weston (1979) searched for an appropriate model of the school as a social system. She opted for Schon's (1971) model, not least because it found empirical support from preceding studies (Taylor *et al* 1974a, 1974b). Schon characterizes a social system as a "complex of individuals which tends to maintain its boundaries and its pattern of internal relationships ... which strives to remain in something like an equilibrium" (Schon, 1971, p.53, p.32). This is an important perspective because it identifies an innate conservatism based on normative behaviour common to all social systems, not just a characteristic of education systems as a whole or schools in particular. Within this model is the concept that the system has *inter alia* a structure and a theory. Weston believes that the model applies to schools, departments and classrooms. She used it in her own investigation into the curriculum, finding that it suited her concept of "curriculum negotiation" (introduced in Chapter 2). As a description of a social system it highlights the nomothetic perspective, so it is necessary to recognize that whilst a school or department may agree on elements of a "theory", there are likely to be significant differences between subject departments and individual teachers for the reasons suggested in Chapter 2. Weston's concept of negotiation has two forms (Weston, 1979, p39): **formal** and **informal**. The formal kind occurs within the structures of a school set up for discussion of curriculum issues (such as a curriculum group or a departmental meeting) and the informal kind takes place when there are encounters between staff outside the boundaries of this structure. Whether in the context of formal or informal negotiation, the micropolitical perspective that Ball (1990) calls for has particular application in the encounters within a unit such as a school or a large department, where there is likely to be a considerable range of opinions across interest groups and individuals. An analysis of the change process in a school, therefore, must anticipate the need to pay attention to micro-political activity within the system.

Whilst it is useful to find characteristics that schools have in common - such as a departmental structure, or a timetable - it is essential to recognize that each school has features that make it unique. Rutter *et al* (1979) concluded that schools have a distinctive ethos which affects the *pupils* in them. Westoby (1988) prefers the term "culture" to ethos, and that term is used by Fullan (1991, p.77) with particular reference to those features of a school that enable or inhibit change. With particular regard to curriculum change, McCormick and James (1988) draw attention to Hoyle's (1975) idea of a "creative school", pointing out that for Hoyle, whereas "teacher professionalism contributes to the creativity of the school ... the school itself can also be an agent of professional development in teachers" (McCormick and James, 1988, p.31).⁹

The important point to emphasize for the moment, and which will be included in the next hypothesis, is the idea that *schools* may indeed have characteristics that help or hinder the implementation of change, and I shall identify such characteristics of the case study school in subsequent chapters.

Whatever the limitations of the NCC documentation on implementing the national curriculum, it did identify the *need* for a planning process at school level. In each school, the intentions expressed in the statutory subject Order had to be translated into teaching intentions for groups of pupils timetabled with teachers in an appropriate way. In addressing such decisions in the context of planning a technology curriculum, Clegg, Medway and Yeomans (1987) suggested a model (from which Figure 3.2 overleaf is adapted) that acknowledges various *influences* on planning in a given school, that may affect the possible *solutions* at the level of a structure for the D&T curriculum. The model indicates that the solutions to a common problem presented to schools - for example the implementation of D&T - will be determined as much by local circumstances as national ones, reinforcing the view that the focus for the change process is the school.

⁹ The professional development of teachers is considered in the section devoted to teachers.

Although intended primarily for planning purposes, the model also serves to highlight the uniqueness of the circumstances of any one school engaged in the process of curriculum change. Some of these circumstances (available staff, pupil numbers, accommodation, etc.) are likely to change from one year to the next, which means that planning for implementing the curriculum is not a once-off activity, but has to be repeated each year.

Considered in further detail, in the case of D&T implementation, the *contextual influences* are those regarding the development of technology in the curriculum outlined in section 2.3. As Weston (1979) noted:

tradition, inertia, the piecemeal and *ad hoc* nature of most educational change, and the differential status accorded to different "subjects" in the curriculum (often because of the association of certain subjects with the education of controlling elites) make the curriculum the product of historical as well as of contemporary decision making (Weston, 1979, p.10).

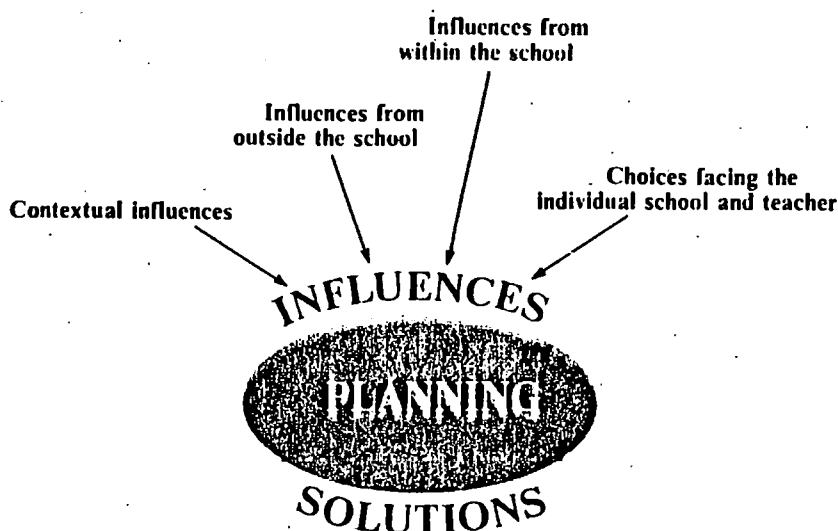


Figure 3.2 Model of the process for planning the technology curriculum (adapted from Clegg, Medway and Yeomans).

Influences from outside the school include public examination syllabuses, and clearly, in this case, the national curriculum technology Order. *Influences from within the school* regarding D&T implementation are the current disposition of the school towards technology, including cooperation between departments, teacher competence and enthusiasm, and facilities and resources for its teaching. Finally, it is suggested that choices facing the school and teacher offer scope for decision-making. Although D&T is subject to a statutory Order, I noted in Chapter 2 that the process-based programmes of study and attainment targets did offer scope for choice of content by teachers. Making that choice is more problematic when a previous subject meaning-structure has been replaced by one offering limited support for the construction of a new one. I shall use the planning model in Chapters 5 to 7 to illustrate the complexity of the decisions made in Upgrove School as part of the process of implementing D&T.

A power-coercive strategy ignores the complications of such planning decisions and simply requires people to get on with implementation. An empirical-rational strategy may accept the need for such planning, but fails to appreciate its complexity in such a case as school subject teaching. A normative-re-educative strategy recognizes the factors that are involved in achieving change, and makes more visible the issues to be addressed in school-level planning for the change.

I have drawn attention to the expectation on the part of teachers that there will be support within the subject community, possibly from I.e.a. advisory staff or other providers of in-service training. Teachers have not conventionally looked to heads or their deputies for particular involvement in the solution of curriculum issues. However, the national curriculum affected whole schools, and could not be brought about without the involvement of senior staff. Therefore, before turning to a consideration of departments it is necessary to make some reference to the role of heads and deputies.

Watts (1980) draws attention to the changing nature of headship as secondary schools became comprehensive and much larger. Confirming a view noted earlier about the

extensive powers enjoyed by heads, Watts notes that:

The complexity of any school is greater than it was twenty-five years ago ... This is particularly true of a comprehensive school ... catering as it does for the needs of all sorts, conditions and ages amongst the young of a pluralistic society. The school is less isolated than in the past from its surrounding society: it has to cooperate with bodies as diverse as the probation service and university admission tutors, the Schools Council and Race Relations Boards (Watts, 1980, p. 293).

Watts goes on to note under six headings the powers traditionally available to a head: defining the objectives and values for the school, determining the curriculum, controlling the internal organization, distributing money, choosing staff and controlling communications. These aspects of a head's power will be used in Chapters 4 to 7 as part of the understanding of the context for curriculum change in the case study school. Watts' purpose in drawing attention to a head's powers is in arguing for a sharing of power and a delegation of authority to a management team. Ball and Goodson (1985, p.11) note the emergence of the "senior management team". They worry that the "application [of management theories] to a person-centred enterprise such as education is deeply problematic" (Ball and Goodson, 1985, p.11). However, it does demonstrate two things. First, the increasing bureaucratic complexity within secondary schools making management more complex and complicating communication structures, and secondly a consequent shift from the previously-noted earlier situation under the 1944 Act that did allow heads considerable personal power. Large comprehensive schools might reasonably be expected to require different management structures and styles from their smaller predecessors. The *consequences* of a particular approach to managing a school will feature in the subsequent analysis of how change was approached in the case study school, and this will lead to some observations about what is needed of management when change is required.

Departments

Secondary schools are conventionally organized into departments having responsibility for teaching certain subjects. Secondary school teachers construct their own meanings partly by locating themselves within their departments. Research suggests that just as a school has a culture, so does a department. Weston (1979) distinguishes between two kinds of department: **single subject** or **integrated**. Single subject departments (e.g. maths, English) have a particular characteristic according to Weston, in that departmental ties between members are strong because they

reflect subject or specialist loyalties which transcend the school context and which might be reinforced by membership of a national 'subject' organization. Thus the department could be seen not only as a functional unit within the school's organization but also as a cell in a much larger structure representing the interests of those with a common background in one subject or specialism whether in schools, universities or outside the public educational scene (Weston, 1979, p.64).

This provides a link between the discussion of subjects and their communities in Chapter 2 and the consideration of schools and their departments in this. Weston uses the term for the other kind of department - integrated - by way of making the contrast rather than by making any kind of judgement on the coherence or otherwise of a department. Thus, for example, a humanities department would be described as integrated, even if it contained members who taught clearly-defined subjects such as history and geography. The distinction is useful up to a point, but it must be recognized that some departments demonstrate characteristics of each. For example, a department often having a clear 'subject' identity within the school is a science department - it has a national body (the Association for Science Education) and it often represents a powerful lobby in a school. But many of its members are likely to have been trained in biology, chemistry or physics, each of which is a university level subject having its own characteristics that distinguish it from the others. So I suggest that a **hybrid** department (such as science) is a third option. This recognizes the significance even within apparently homogeneous subject departments

of its members having connections with different interest groups having a particular view about the nature of their subject and the way it should be taught. The previous chapter offers the obvious example of this as a CDT department, and a wider department assembled to teach D&T would be a similar case. I also want to introduce the concept of a **transitional** department as being necessary to represent, for example, any regrouping in response to new curricular requirements such as required in many schools, including Uppgrove School, in order to implement D&T.

Weston goes on to discuss other features that give a department its identity. She suggests (in addition to the subject/integrated distinction) the **priorities of its members**, its **size** and its **sense of territory**. In terms of members' priorities, such features as aspirations for academic success (in subjects having university entrance credibility) may contrast with aspirations for pupils' personal development in craft areas. This links with the discussion in Chapter 2 about the different aims that different interest groups have for the education they are offering. A hybrid department (such as CDT or one formed to teach D&T) is likely to demonstrate a range of beliefs *within* the department. Sense of territory is often a feature of subjects needing particular equipment or facilities (such as Art, BS, CDT, HE), not only because the great proportion of that department's teaching is done in particular rooms, but also because those rooms are often not used or even visited by other members of staff. However, what may have been a strength in these individual departments may become a weakness if they are separately located when required to contribute to the teaching of D&T. For example, problems may arise over exchange of information and negotiation because of limited opportunity for informal staff contact, and pupils may continue with their perception of separate departments. Again, these ways of understanding the nature of departments and the way their culture may affect the curriculum change process will be brought to bear in the analysis within the case study.

Teachers

Whatever kinds of schools or departments they find themselves in, the ultimate interpreters of curriculum intentions for pupils are individual teachers. A requirement to teach a new curriculum comes into a teacher's present situation, so this section seeks to understand that situation and to ask how a teacher may be supported in responding to change.

The nature of teachers' work has been the subject of study over a long period. When Hargreaves and Woods were assembling their volume *Classrooms and Staffrooms*, they saw fit to include extracts from Willard Waller's writing of 1932. For example:

The teacher-pupil relationship is a special form of dominance and subordination, a very unstable relationship and in quivering equilibrium, not much supported by sanction and the strong arm of authority, but depending largely upon purely personal ascendancy ... Conflict is in the role, for the wishes of the teacher and the student are necessarily divergent, and more conflict because the teacher must protect himself (*sic*) from the possible destruction of his authority (Waller, 1932, in Hargreaves and Woods, 1984, p.164).

Since such observations, further light has been shed on the task of teachers in this country since the 1960s by sociological researchers using a range of perspectives. Ball and Goodson (1985) identify sociological studies based on "role" (e.g. Wilson, 1962) as typical of the 1960s with teachers "mechanistically and unproblematically responding to the powerful expectations of their role set" (Ball and Goodson, 1985, p.7). From this "role"-based non-problematic view of teaching (which suggests a lack of attention to such as Waller's words, and has strong echoes of the view of teachers contained in an empirical-rational change strategy), Ball and Goodson trace the previously-noted trend first towards "blaming the teacher" (during the 1970s) and subsequently towards investigating the constraints under which teachers work, especially using Marxist perspectives and interpretations (e.g. Sharp and Green, 1975). Within this Marxist perspective the teacher is seen as locked into a socio-economic system, whereas from the alternative "interactionist" perspective were perceived "the more immediate problems involved in resolving the dual

demands of instruction and control in the classroom" (Ball and Goodson, 1985, p.7). Ball and Goodson saw in the mid 1980s a productive combination of Marxist and interactionist approaches as illuminating teachers' work:

The teacher is seen as involved in the development of creative, strategic responses to societal and situational constraints (Hargreaves, 1977; and Pollard, 1982) or as resolving ever present dilemmas (Berlak and Berlak, 1982) through and within their interaction with pupils (Ball and Goodson, 1985, pp.7,8).

From his current perspective, Fullan (1991) draws attention to the notion from Huberman (1983) and Crandall *et al* (1982) of the "classroom press" which:

draws [teachers'] *focus to day-to-day effects* or a short-term perspective; it *isolates them from other adults*, especially meaningful interactions with colleagues; it *exhausts their energy* - "at the end of the week, they are tired; at the end of the year, they are exhausted" (Crandall et al, 1982, p.29); it *limits their opportunities for sustained reflection* about what they do - "teachers tend to function intuitively and rarely spend time reasoning about how they carry out their jobs" (Crandall et al, 1982, p.29). Further, it tends to increase the dependence of teachers on the experiential knowledge necessary for day-to-day coping, to the exclusion of sources of knowledge beyond their own classroom experience (Fullan, 1991, p.33).

It is into this environment that requirements, like responding to externally-imposed curriculum change, arrive. It is a major part of my thesis that, in the case of a required curriculum change, the response demanded by this imposes considerable strain on a teacher's handling of the day-to-day requirements of the job which, therefore, affects the teacher's response to the required change. For this reason alone, change may not be welcomed and the need for professional support within an appropriate change strategy is apparent.

Whatever paradigm or perspective is being employed to shed light on the job of teaching, what is revealed boils down to the same thing: the day-to-day requirements of the job are thoroughly demanding on a teacher's abilities, and cannot be reduced to a mechanical or

rational function. Hargreaves and Fullan (1992) note that:

Teachers teach in the way they do not just because of the skills they have or have not learned. The ways they teach are also grounded in their backgrounds, their biographies, in the kinds of teachers they have become. Their careers - their hopes and dreams, their opportunities and aspirations, or the frustration of these things - are also important for teachers' commitment, enthusiasm and morale. So too are relationships with their colleagues. (Hargreaves and Fullan, 1992, p.ix).

This identifies areas beyond those of the preceding discussion, which was focused on the "here and now" of the teacher's job. Ball and Goodson (1985) have sought to contribute work on teachers' lives and careers, feeling that an understanding of the job that ignores attention to a teacher's progression through a career misses out on a significant factor. Research into teachers' careers identifies both objective and subjective aspects. The objective aspects are those external factors that impinge from time to time¹⁰ and the subjective are the personal ones. The life history approach illuminates this and (quoting from Goodson (1981)) they argue for

the reintegration of situational with biographical and historical analysis ... [to] ... move away from studies where the human actor is located and studied in a manner contrively divorced from the previous history of both the actor and the situation (Goodson, 1981, p.69).

Drawing all this together, the need within a change strategy is to address rather than ignore or dismiss the nature of a teacher's job, including individual circumstances such as where in their career they happen to be, when addressing questions such as why teachers respond in a particular way to change requirements. Recognizing the importance of the subject of teachers' careers leads to the question of how those careers may be developed, and how that development may interact with a teacher's response to a change requirement.

¹⁰ For example, Ball and Goodson identify historical stages such as the expansion and progressivism of the late sixties and the contraction and low morale of the eighties.

Given a view of teaching as a profession,¹¹ there are insights that can be brought to bear such as Schon's (1983) view of the reflective practitioner and Hoyle's (1980) suggestions about restricted and extended professionalism. Schon's view of reflective practice is that the professional needs to be able to "stand back" from what is routinely carried out (as, for example, in the day-to-day aspect of teaching) in order to be self-aware. Then, when it comes to facing the need for a response to change, the means of dealing with it are available within the individual. Hoyle's view is that a restricted professional tends to focus closely on the quality of the classroom interaction whilst not being too concerned with the educational world beyond that room, whereas the extended professional will be more inclined to engage in in-service training (In-set) or other professional development activities connecting with that wider world. McCormick and James (1988) reflect on Hoyle's "empirically untested" view of professionalism, preferring Stenhouse's description of an extended professional as having "a capacity for autonomous professional self-development through systematic self-study, through the study of the work of other teachers and through the testing of ideas by classroom research procedures" (Stenhouse, 1975, p.144). They rightly point out that this is the basis of Stenhouse's 'teacher-as-researcher' concept, but I shall show in the case study that it has a bearing on response to externally-required change, as much as on any desire to engage in personal research.

The earlier discussion about the processes of curriculum change has included the suggestion that teachers need support in responding to and effecting change. In the past, many teachers had careers lasting forty years, and there was a sense in which any initial training was seen as preparing that teacher for a lifetime of teaching in a given subject area. But even a career of twenty or thirty years, from the 1950s to the 1980s, has seen enormous changes in the world in general and in the world of education. All teachers now

11 Considering teachers' professional development begs the question as to their description as members of a profession. Some writing that is applied to teachers' response to change (such as that of Schon, 1983) draws its examples from other professions. If comparisons are to be made, therefore, it is reasonable to ask if teaching is a profession. The evidence is that it is close enough in practice, especially in terms of a great deal of autonomous decision-making when dealing with others, to be deemed a profession for the purposes of comparison. Debate beyond such working pragmatism tends to become sterile.

have considerable initial training (although this was not the case for some teachers now reaching the end of their careers) and the need and opportunities for In-set have emerged gradually. McCormick and James find a parallel (up to the mid 1980s) between the changing nature of In-set and the changing nature of curriculum development: both having reached the stage where central resources were combined with local needs (for example, through the activities of teachers' centres). Whilst they find the concept of professional development somewhat elusive, they maintain that it is linked to In-set. They also feel (McCormick and James, 1988, pp.41-43) that there is evidence that professional and institutional development are linked. This leads them to suggest that:

Whatever the relative merits of encouraging teacher development or the development of the whole school, the ultimate goal remains the same: the improvement of opportunities for learning among pupils. In this respect dissatisfied teachers, and schools lacking a sense of common purpose, are unlikely to be able to provide educational experiences of an appropriate quality. The task of management, therefore, is to provide the kind of structures for career development, in-service education, and curriculum development and review that are likely to enhance the quality of educational provision. And it is likely these will incorporate a blend of individual and institutional concerns (McCormick and James, 1988, pp.42, 43).

This points to a particular responsibility for headteachers and their teams, suggesting that an inadequate strategy in this regard on the part of management teams will significantly affect the implementation of curriculum change.

3.5 Towards the implementation of D&T

The discussion in the preceding sections has raised important points for the process of implementing D&T at school level, which is the focus of the case study in Chapters 4 to 7 of the thesis. These points are suitably summarized by the introduction of two further hypotheses. The research evidence is that all involved in the change process need to construct meaning for a new specification of what they should teach. A normative-re-educative change strategy demonstrates features that most closely acknowledge and

support the circumstances of teachers' work and their ability to respond to change. However, such a strategy requires time and appropriate support for teachers.

The fourth hypothesis is that the features of a normative-re-educative strategy are most suited to enable teachers to carry out curriculum change, but these features were not adequately recognized in the case of teachers being required to implement national curriculum D&T.

The survey of the nature of schools, departments and teachers leads to the following hypothesis which will be examined against the evidence from the case study.

The fifth hypothesis is that individual teachers, departments and schools all have characteristics (which are partly to do with their present circumstances and partly with their history) that will significantly affect the change process in a given situation.

The validity of the fourth hypothesis will be explored immediately, in the remainder of this chapter, against the evidence of material made available at national level. It will subsequently be explored at local level in Chapters 5 to 7 against the evidence of the case study. The fifth hypothesis will be examined through the case study, and both will be reviewed, along with the other hypotheses, in the final chapter.

The national approach to the implementation of D&T

In this section I shall necessarily revisit some of the aspects of the national specification of D&T that I considered in Chapter 2. However, here I shall focus on the evidence for change strategies, showing how initially elements of an *empirical-rational* approach appeared within an overall *power-coercive* strategy. The whole national curriculum was presented in the context of the Education Reform Act of 1988 which set up the legal framework within which statutory Orders for each subject could be laid before parliament. The Act also required the public reporting by schools of the results of assessment of pupils at the end of each Key Stage. As previously noted, this indicates an overall power-coercive framework within which schools and teachers would have no choice but to respond to the

specified timetable of introduction, the programmes of study and the statements of attainment for each subject. There were also elements of the empirical-rational approach, in that the whole tone of the documentation for the national curriculum suggested that what was to be implemented would be demonstrably better, and, therefore, more acceptable, than what already existed. The consultation document (DES/WO, 1987) noted that

The Government wants attainment targets and the content of what is taught to reflect current best practice and achievement. Both the objectives (attainment targets) and means of achieving them (programmes of study) should leave scope for teachers to use their professional talents and skills to develop schemes of work, within a set framework which is known to all (DES/WO, 1987, Annex A).

An early piece of information from the National Curriculum Council (NCC, 1989b)¹² outlined the planning process for schools as follows:

The way plans are made can be as important as the aims they seek to achieve. The nature of the changes must be understood, priorities established, and responsibilities for the various tasks clearly laid down. A continuing programme of INSET must be planned, both in a school or group of schools and include external activities and support ... The National Curriculum creates a framework for rethinking school approaches to curriculum planning and development. Statutory requirements, however, do not represent a whole curriculum policy. Major decisions about curriculum organization and resources remain within the school.

A ten-point plan of action:

Understanding and using the new terminology; Studying the documentation; Preparing a National Curriculum Development Plan; Developing a curriculum organization; Preparing cross curricular plans; Writing schemes of work; Designing pupil and teacher records; Deploying

¹² A leaflet contained in the general folder identified as NCC, 1989c.

This general rational framework was presented within material made available to all teachers (NCC, 1989c, 1989d). In terms of particular subjects, the various reports of the working groups were the early indicators of the way thinking was going, as was shown for D&T in Chapter 2. In terms of the process of curriculum development, some work was carried out in schools as D&T was developed, although the short timescale meant that the results of such projects were always likely to be available rather late. When the interim report was published at the end of 1988, the *Times Educational Supplement* (16th December, p.8) disclosed "Government-backed plans for 16 schools to try out the blueprint". The intention was for the schools to submit reports to the Centre for Educational Studies at King's College, London, which would then give evidence to the NCC in the autumn (of 1989) "to help shape the design and technology curriculum". This was a further development of an existing "Technology Education Project" started in 1985 and reported in May 1988 (Black, Harrison, Hill and Murray, 1988) to test out some of the ideas expressed in Black and Harrison's (1985) *In Place of Confusion*. Whilst this does indicate some attempt at developing pupil materials, it has associated with it the previously-noted problems of any RD&D project - the teacher as passive consumer - as well as the impractical timescale.

At a later stage, after the final report, another, larger project was initiated (as outlined in the *TES* of 23rd June 1989, p.20) in which fifty secondary schools were sought to pilot an "all-out approach to the national curriculum for design and technology". This project was run by Ben Kelsey (of the previously-noted Hampshire Business and Information Studies course), Kelsey being a member of the D&T working group. It was intended as a trial run through D&T, and developed into the National Design and Technology Education Foundation (NDTEF) with Kelsey as director. The results from its pilot work became available in late 1990, after implementation had begun. The need for all teachers to be implementing D&T in Y7 in September 1990 meant that decisions about organizing its teaching had to be made before the results of pilot work became available.

The official documentation for D&T comprised the statutory Order and the Non-Statutory Guidance (NSG) (NCC, 1990): the latter, in the case of England,¹³ being a rather bare-bones account of how the teaching of D&T may be planned at departmental and class level.¹⁴ By late 1990, a whole range of support material was being produced,¹⁵ but it was too late to inform initial decisions. I have already noted (Chapter 2) the concerns of some writing in 1990 (Medway, McCormick, Harrison) who sought a more philosophical approach to technology education to the rather pragmatic solutions being offered. There is little evidence that the government recognized the issue of enabling teachers to construct meaning for the required changes, or that it anticipated the need for a normative-re-educative change strategy. The timescale for implementation related more to the government's determination to effect change rapidly, than to allow teachers the time necessary to make the changes. I have already noted how, at a time when support was needed, the structure of I.e.a. advisory teams was under threat.

The suggestion is, therefore, that the fourth hypothesis is upheld in considering the first stages of implementation at national level. The validity of the hypothesis at local level will be examined through the case study.

The final hypothesis, on which I shall reflect in the final chapter, is as follows:

The sixth hypothesis is that, unless all the previous hypotheses are taken into account within a change strategy, the change process is likely to be inhibited, and may result in outcomes that are less satisfactory than is desired.

13 The Curriculum Council for Wales produced its own version.

14 The great majority of developmental thinking that was recorded in the reports of the D&T working group did not find its way into the Order or the NSG. It was only when later In-set material was made available that a pamphlet reflecting on the nature of D&T was produced. This was written by David Layton - the member of the working group credited with the thoughtful initial section of the group's interim report.

15 For example, the Technology supplement to the *TES* of 19th October 1990 draws attention to fifteen commercially-available sets of pupil material, a new television series aimed at D&T, and two conference/exhibitions.

It is now time to turn to the evidence that supports these hypotheses in a given situation. Although the specification for D&T was produced as a document at national level, the intentions contained in this document had to be put into practice in each school, and by each contributing department and teacher. Each school in the country would, therefore, be responding to the requirements from a unique starting point depending on the circumstances in that school. The next chapter, therefore, outlines the context of Uppgrove School, and the subsequent chapters present an account of the change process analyzed with reference to the concepts introduced in Chapters 2 and 3.

4 Upgrove School as a context for D&T implementation¹

4.1 Introduction

The fifth hypothesis within my thesis, introduced in Chapter 3, suggests that schools, departments and individual teachers have characteristics that will significantly affect the process of implementing a requirement to change what is taught. These characteristics arise partly from past and partly from present circumstances. In order to examine this hypothesis against the case of Upgrove School, I shall consider in this chapter the history of the school, and of departments and staff likely to be contributing to the teaching of D&T. As well as allowing examination of the hypothesis, this will also set the context for the remainder of the case study into the implementation of D&T in Chapters 5 to 7. The nature of the school will be established bearing in mind the characterization in Chapter 3 of a school as a social system having a structure and a theory and tending to conserve normative behaviour. The existence of a culture tending either to enable or inhibit change will be examined, as will the existence of structures for micropolitical activity and formal and informal negotiation. The nature of the relevant teaching departments will be established, using the description derived in Chapter 3, and links with wider subject communities (as suggested in Chapter 2) will be examined both for departments and key individual teachers.

I shall consider first the school as it had come to operate by the mid 1980s, up to the time of the announcement of the national curriculum. Because the school was newly-established some twenty years ago, under an influential head who stayed until 1988, it is necessary to demonstrate the significant influence he had on the way the school was organized and run. Then, because D&T was to be implemented by teachers from several departments, it is necessary to consider the nature of the contributing departments, and of the teachers in them, as a first step in understanding the process of curriculum change in the school.

¹ The case study in Chapters 4 to 7 of this thesis is an account and analysis of a real situation. Certain aspects of the account - names and some non-essential details - have been fictionalized. There is neither need nor desire within this thesis to identify the situation to third parties.

4.2 The school

Uprove School is an 11-18 comprehensive located in and serving a small town and its surrounding villages, but also about five miles from a much larger town. Its catchment area is fairly clearly defined and it has a consistent intake of about 200 pupils in seven forms with a sixth form of about 250, thus making a total of approximately 1250 pupils. It was built some twenty years ago with the purpose of filling a gap in provision in secondary education in this location. Its foundation came at a time when the move nationally was towards comprehensive education and it was built up from the beginning as a comprehensive school providing an education for all the children in its catchment area. Being a newly-established school, the building was done in several phases over a period of some years and the first intake of children was in Y7 and Y8 only. The number of staff in the school also grew in stages, from an initial number in the first year of nine including the head.

There are several significant features of the school that form a background to its culture and, therefore, its response to the national curriculum:

- the school has operated non-selectively throughout its life, having had no previous history of operating in a selective environment,
- it is the local community's school, there being no competing establishment in the same town,
- the gradual development of the school from small beginnings helped to produce a closely-knit staff loyal to the first head and to the institution in the form in which it developed. Many of these staff stayed for the best part of twenty years, as did the first head.

A description of the school that came from the present head that encompasses these points and indicates his own characterization is that it is a "sort of oversize village primary school" (NS²). Having operated in a relatively stable environment for twenty years, the

2 The designation NS denotes a spontaneous comment made by the interviewee during an interview in which I noted, rather

school was less exposed than some to the changing needs of society. The present head, who was in post during the period of the case study, was appointed from a deputy headship elsewhere with effect from September 1988. He arrived just as national curriculum implementation was becoming an important issue for the school to address. The present head, therefore, was in charge of the school when decisions about the implementation of D&T were being taken. However, the first head's influence on the school over a period of some twenty years, including its formative stages, was considerable, and has to be taken into account in an analysis of the response to a proposal for change of the magnitude of national curriculum implementation.

The first head and his influence on the school

The first head was a man with a particular mission in education. As the following section will show, he was committed to comprehensive education, but with three particular emphases. The first was a valuing of academic subjects which he felt should be made accessible to as many pupils as possible through appropriate curriculum organization and pedagogy. This led in turn to a focus on subject departments and the development of a sixth form. The second was a desire that all pupils should experience not just academic subjects but also creative and practical ones. This led to a parallel development in the school of subjects having academic and utilitarian characteristics. The third was a view that pupils would work best at subjects that they enjoyed and in which they experienced success. This led to some self-selection by pupils in Y10 and Y11 and a desire on the head's part to timetable the optional subjects as flexibly as possible. The head's commitment to his ideas for his school was also backed up by a strong sense of being able

than taped, answers. Other designations are as follows:

TS: a spontaneous comment made during a taped interview

S: a spontaneous comment made during conversation but subsequently noted.

The designations NR, TR and R correspond in an equivalent way to a response made to a specific question (rather than a spontaneous comment).

Dates are added when they are relevant.

to operate relatively freely within the county's political and financial systems, and to run the school in his way.

The first head's own education was in a grammar school followed by a degree whose subject matter gave him "a critical awareness that things which you tried to measure were often immeasurable" (TS). His teaching career started in grammar schools where "you accepted the 11+ as being fairly right" (TS). However, like many people in the late 1950s and early 1960s, he became increasingly concerned with the impact on children and their families of the process of selection at age eleven. For example, when supervising primary school children sitting the eleven plus he had reflected that he "had all these lovely little kiddies sitting there and I knew that 20% would be selected" (TS). He began to feel that "this was very unfair ... this was the great divide ... you were cut off from any professional career ... any exam work" (TS). Also, "if you looked at it from an economic point of view you were depriving the country of immense potential" (TS). He feels that in some ways "the move to end the eleven-plus came from the ... mums who met in the mornings ... at the coffee mornings ... In the professional classes ... the great obsession from the age of about seven onwards was whether [their children] would get the eleven plus" (TS). However, his empathy with middle-class concern about children "failing" the eleven plus, combined with his own recognition of the implications of reports on contemporary research that demonstrated the margin of error and other problems associated with 11+ style testing. He discovered that "in the NFER tests there was a 13% error"³ (TS). This led him to investigate the outcomes of the selection process within the l.e.a. that employed him. On the basis of this he wrote a letter to the local newspaper which prompted two hundred people to write to him and also brought him a quiet warning from his employers about his career prospects. He became actively involved with a group of teachers and academics who were concerned about the nature of the 11+ and eventually, from what he describes as a relatively comfortable grammar school job, he had moved in 1964 to a

³ Details of the reporting by the National Foundation for Educational Research (NFER) on 11+ tests, and the educational and political reaction to this, can be found in Benn & Simon, 1972, Ch.2.

newly-reorganized city comprehensive school. There, working under a head who combined a vision for comprehensive education with ideas for implementation and organization, he had been required to teach pupils in mixed-ability groups. For him this was "starting as a complete novice ... it was a hard learning process but it did me the world of good" (TS). Part of that experience was that he was expected by his head to take responsibility within a subject department for developing teaching methods that would enable a range of children to tackle academic subjects. The pedagogy that he adopted was to offer a variety of materials to pupils including commercial and school-produced audio-visual stimulus material, along with more conventional methods. He felt that variety of approach was important in engaging pupils and sustaining their interest. The work was done in *subject* departments within which "we all drew on each other's experience ... but we stuck to what we knew in terms of subject divisions. We didn't have cross-curricular themes: nobody used the phrase" (TS). He says of this experience that "it did alter me a great deal as a person ... we had established one approach which could lift children in mixed-ability classes ... it was paying off in educational terms ... we wanted children to like school" (TS).

By the time he was appointed head of the newly-founded Upgrove School, he had experience of running his own department within this mixed-ability approach and of setting up an open-access sixth form. He had also come to realize the macro- and micro-political nature of education, and was impressed with the style of the head of the comprehensive school where he had been working. This head would use political action to obtain the best resourcing possible for his school, and placed a strong emphasis on "cash at the margins" (TS) (which meant that this head tried to support teachers' requests for equipment to support the desired pedagogic approach). The opinion favouring comprehensive education found strong support in Upgrove School's founding governing body and in the community. The first head rapidly identified potential allies and antagonists within local politics, and was sufficiently confident to use political manouvering at whatever level was necessary in getting the school established in the way he wanted.

The following extracts from the Uppgrove School staff guide (SG)(taken from the 1985 edition, but not significantly different from earlier ones) indicate the views that he brought to his new appointment:

The end of selection at eleven and the development of Comprehensive Schools acknowledged the fallibility of eleven-plus selection. However, the vast majority of Comprehensive Schools still selected first year pupils internally in order to stream by ability. Internal tests of even less validity than the rejected carefully controlled tests of the official bodies now became the basis for selection of pupils and the starting point of the all-important expectations. It was because the tests of ability at eleven are so fallible that we did not test and stream in this school. Because we do not stream ... we can use expectations to lift many more children than would be possible in a streamed situation. The opportunity is there but the outcome is not inevitable. A mixed ability group with a teacher who expects much from them will perform differently from a similar group taught by a teacher who expects little, who emphasizes faults rather than virtues and lets them know that their academic failings are synonymous with defects of character and personality (SG, 1985, p.2).

His belief was that more children could succeed in conventional academic terms (examination results) given the right approach, starting points and support. In effect, he wanted to give as many pupils as possible the opportunity to succeed within a grammar school subject and examination ethos, and believed this was possible with the right approach to teaching.

If the atmosphere of expectation is right then we are likely to have more pupils working purposefully; more pupils achieving results in external examinations ... A simple hope in starting this place ... was that more children would achieve more in the measurable academic sense (SG, 1985, p.2).

His vision of developing teaching methods that would enable a range of pupils to succeed in academic subjects was strongly presented to staff who were appointed, and they were expected to take on the demands of working in this way. The essence of mixed-ability teaching, for him, remained that it makes use of multi-media starting points engaging

children with familiar things and moving them from there into academic disciplines. Thus, for example, he "wanted everyone to do some science" (TS), and for some pupils for whom the approach would come more appropriately through practical work, he quickly established rural studies. To ensure the success of this course a link was established with a local agricultural college. Interestingly, in the light of Goodson's views, this rural studies course eventually developed into an examination course in KS4. According to the first head, the pressure for this came from "a deputation of pupils who wanted to do an examination" (TS).

A complementary aspect to his desire to engage the largest possible number of pupils with academic subjects was that he wanted "academically able" pupils to experience the practical subjects that were lacking in a conventional academic education. For him, one of the basic ideas of a comprehensive school was to give pupils a wide curriculum. In the comprehensive school in which he had had his formative years as a teacher there was a "marvellous suite of workshops ... I saw what they did ... it was an inspiration" (TS). This contrasted with his previous grammar school experience where workshops were out-of-the-way places: "never the twain shall meet ... the curse of English education really" (TS). Therefore he combined the idea of pupils sampling widely and being encouraged by appropriate teaching methods to succeed academically in KS3 with a view that by KS4 there should be a wide choice and pupils should be allowed to select subjects that they felt would suit them best. These views about pupils' access to the curriculum were held within a framework that indicated different levels of ability in children. The staff guide contains phrases such as "all ranges of ability", "the bright child", "the weak child". In practice, on the evidence of staff, children did tend to self-select into more or less academic courses in Y10 and Y11. This links with another feature of the head's approach which was that pupils would be most contented in studying, and therefore perform best in, subjects which they had chosen to do. Therefore, in Y10 and Y11 a priority was to allow pupils wherever possible to study subjects which they chose. This requirement was serviced at the level of timetabling by prioritizing teaching in Y10 and Y11 by specialist teachers, and by making adjustments elsewhere if necessary. Flexibility was achieved by using staff to teach second subjects in the lower years, and also by using temporary part-time staff. Therefore, his

view was very strongly that, although the school should offer a curriculum that enabled pupils to be good candidates for further education or the job market, they should also be able to opt for subjects of their choice rather than being required to study a wide range of subjects in Y10 and Y11.⁴ A final feature was his encouragement of staff with particular interests to offer them as option choices. Therefore, for example, the presence of a member of staff interested in photography and willing to teach it meant that there might be a course in photography in a particular year if there was demand for it.

The first head was essentially a believer in subjects and quite dismissive of some attempts at integration. "I had reservations about integrated studies ... watered down courses ... Irish stew for the less able" (TS). However, he did allow some initiatives of a cross-curricular nature: the essential mechanism seemed to be that staff had to take such proposals to the head, who would vet them. One such venture was attempted in the technology area. It ran for about four years between the boys' craft and physics departments as an Engineering Science CSE taught as a core with options (and therefore teachable by specialists). In this case, the head had responded to an enthusiastic approach by a newly-appointed member of the boys' craft department along with two other teachers. The head saw it as raising possibilities within craft for a more academic approach: "It was a good course and pupils enjoyed it" (TS). Thus there is local evidence of a tendency for encouragement for an essentially utilitarian subject to move towards the academic form (as was also the case in the adoption of an examination syllabus in rural studies). The Engineering Science course ceased when it became expensive to justify in terms of materials and staffing costs, and when the nature of boys' craft itself was nationally turning to CDT.

The school had developed a strong sixth form providing a wide range of A-level options. Its initial formation illustrates the head's willingness and ability to make unilateral decisions within the l.e.a., because he accepted pupils on to sixth form courses and then presented a political ally in the l.e.a. with the *fait accompli*. At this stage "they rushed

⁴ There was guidance from staff who tried to keep pupils on the path between simply opting for subjects they enjoyed or found easy and ensuring a reasonable breadth of experience.

round and pinned the necessary notice of intent to the school door" (TS).⁵ Having a sixth form was an essential part of the head's vision for the school. It provided evidence for parents that the school offered all the education needed for the able pupils, and it also gave him the basis for appointing well-qualified staff whom he regarded as needing the stimulus of sixth form work to keep them best engaged. The presence of a sixth form offered the possibility for A-level work within departments that could offer and support it. A later development within the sixth form was the introduction of a one-year course set up to provide a bridge into employment for pupils who did not want to go on to A-levels. It was built around commercial subjects: the head having realized that the commercial college to which some 16+ leavers transferred was difficult to travel to, being on the far side of the nearby town. The course was initially planned with the head of the commerce department, and continued to be offered throughout the period of the case study, attracting up to twenty pupils per year. Its existence provided a considerable *raison d'être* for the commerce department, the significance of which regarding D&T will become apparent in subsequent chapters.

The head's staff guide was an annually-updated document of over thirty closely-typed pages describing aspects of the school's structure and rationale. He made no secret of his own rationale and his reasons for holding it. His own style of headship was to minimize meetings and paperwork, and to teach a half timetable: "I reckoned I could do the paperwork in an hour a day" (TS). In keeping with his view of the curriculum as based on subjects he expected the staff to get on with their job of teaching within their subject departments while he managed the school and fended off unnecessary intrusions from outside. Comments from staff have confirmed his way of running the school. Management of the school was not open, meetings of staff were few, and departmental structure was fragmentary: the figure of twenty-six "departments", some of one teacher only, being quoted by one member of staff.

5 This is an excellent example of the head's willingness to engage in political manoeuvring.

He retained close control of appointments to his staff right through his time in the school. He was aware of the demands he would be making on staff initially appointed to a school having an approach rather different from many existing state secondary grammar or modern schools. He looked for "experience of one or two schools, academically able or alive, age twenty-eight to thirty" (TR). He also said there was a "gut feeling" (TR) about people who would be flexible and good to work with in a team. The requirement for academic excellence resulted, for example, in the science department having four teachers with PhD's at one stage. In explaining what it was he looked for in teachers of craft subjects, he said "technically capable", "first class craftsmen" (TR). He also expected staff loyalty, and this resulted in a very low staff turnover and a large proportion of the staff staying in the school for many years. His view is that by giving people different responsibilities at different times he could extend their experience and keep them motivated.

He also made an early promotion (in the school's second year) of his first woodwork teacher to a deputy head. He believes that, within the school "because he was deputy head and he was in technology and seen to be down there and he had overalls on ... it gave a message" (TS). He also observed that it "gave a nice interesting message to local schools about who was appointed for these sort of posts" (TS).

There is little doubt that he and the staff of the school enjoyed the support of the local community in running the school along the lines that the first head intended. He had set out to establish a school that would enfranchise children across the whole ability range. Nevertheless, the framework was that of conventional academic subjects that would not have been out of place in a maintained grammar school of the same period. The whole thrust of the head's philosophy gave a powerful presentation to the community that this was a school in which the children were most likely to succeed academically. The evidence of examination results and university entrance figures is that many children do

succeed in this way.⁶

When the first head got hold of the government's national curriculum proposals (DES/WO, 1987) he was "horrified by what he read" (TS). The fundamental thrust towards a compulsory curriculum for all pupils was directly opposed to his own policy of matching curriculum and pupil. He believed that the proposals indicated that there would be no room for such flexibility. Using a political technique that he had successfully applied in the past, he circulated the local community and held a meeting which 500 people attended because he felt that the national curriculum as proposed was diametrically opposed to the school's rationale and good practice. But the national curriculum was making inexorable progress towards being legally-binding under the eventual enabling of the 1988 Education Reform Act (ERA), and he was nearing retirement age, so he decided that he would withdraw from the fray. He took early retirement in July 1988. There seems little doubt that his own reaction to the national curriculum influenced the initial response of some of his staff, but staff also had their own reactions, which will be analyzed in later sections. When I first arrived in the school, less than a year after his departure, there was a profound feeling on the part of many staff that a particularly significant era in the school had come to an end.

All these features of the first head's time with the school form part of the background in this school to the arrival of the national curriculum and are necessary for an understanding of the response in this school to this event. As one long-serving member of the CDT department put it, "he was his own head in his own school and his own school worked his way" (TS). In the terms of Watts' (1980) analysis, introduced in Chapter 3 of this thesis, the first head ran the school in a way that suited a small school operating in a stable environment. The objectives, values and curriculum originated in his ideas, and the internal organization and control over money, appointments and communications, left him with much power and many of his staff with little experience of responsibilities beyond

⁶ From a school document for the school year 1990-91: In the GCSE examinations the school entered all eligible pupils for one or more subjects. 99.1% were entered for five or more. From this entry 41.2% obtained five or more passes at grades A-C and 98.2% passed with grades A-G. In the A-level examinations sixty students took 162 examinations, leading to 81.5% A-E passes.

those of department-based subject teachers. Many of these features have particular implications for the implementation of national curriculum D&T in the school, and will be picked up in subsequent sections. In Chapter 3 I noted that Fullan (1982) draws attention to the climate of change identified by various writers, including Donald Schon, in the early 1970s. Schon's recognition that society was moving "beyond the stable state" contrasts with the first head's establishment of a regime that held stability of the school environment to be a virtue - because he felt that was the best kind of environment for the task of educating children. His values were of the kind that looked for a stable and loyal teaching staff who concentrated on their subject specialisms within small and self-contained departments. He believed most profoundly that that was the way to provide what the children needed and their parents wanted. However, the kind of stability that was part of the school's culture until the mid 1980s was a stability that tended to be conservative in its response to the external motivations for change that are always a feature of education systems. For example, the school was quite late in becoming involved in TVEI and CPVE⁷ schemes. The head saw himself, and the staff saw him, as the gatekeeper who would allow them to get on with their job. It is a further indication of just how much power headteachers could exert within their schools within the l.e.a. structure that existed under the 1944 Act. When the national curriculum "ramraiders" (the new head's term) arrived at the doors of the school, the gatekeeper was to find that the gate could not withstand the impact.

The school as a whole, therefore, had a culture that tended to regard externally-instigated change with some suspicion. The evidence to be presented about the school before the arrival of the national curriculum is that changes had been made, but these tended to be those that were sought from within because they favoured the development of a particular department. The national curriculum required each subject department within the school to respond to its relevant subject Order.⁸ Whilst the culture of the school as a whole affected

7 Certificate of Pre-Vocational Education.

8 Orders did not emerge simultaneously. Maths, English and science appeared first; technology followed a year later.

its response to change, so also did the culture of the departments and the nature of the individual teachers. Therefore the next section considers those departments likely to be contributing to the teaching of D&T in Uprove School.

4.3 The departments potentially contributing to D&T

All the subjects identified in national documents as being likely to be able to contribute to the teaching of D&T (Art, BS, CDT, HE and science) were taught in separate subject departments in Uprove School. Not all these departments became involved in the teaching of D&T. Those not contributing (art and science) will be introduced in sufficient detail to identify their reasons for not contributing, but more detail will be included for those departments which did. As was the case with the school as a whole, I will introduce the departments and their teaching staff in order to show the context within which they were faced with the need to introduce D&T.

The non-contributing departments: art and science

Art

The art accommodation adjoins the CDT accommodation in one wing of the school. There are two full-time and one part-time art staff. The continuing presence of this latter specialism indicates one example of a relatively unusual subject catered for and enjoying support in this school. Art courses are offered through to A-level, and the approach is indicated by a quip from the head of department that "we're fine artists here!" (NS). The art staff and the CDT staff share a small staffroom in the block, and some members of the CDT staff are occasionally timetabled to teach art lessons. The relationship between the art and CDT teachers is entirely cordial, as most of them have occupied the one block for many years. However, whereas CDT and HE had to share a circus arrangement for teaching in Y7 and Y8, art maintained its own presence in the timetable of these pupils. There was, therefore, a social grouping of art and CDT staff, and some discussion of areas of mutual interest (such as the graphic design aspect of CDT). But the two departments were essentially separate. In this school there had been no establishment of a department of

art and design, or of a wider faculty. This continuing separate identity for art was the reason why art chose to remain outside the D&T group.

Science

I have already noted that, at one stage in the school's history, there had been an initiative between the science and CDT departments to teach an Engineering Science CSE course. However, that initiative had ended well before the national curriculum approached. The science department was one of the largest in the school with an existing head of science (doubling as head of biology) as well as heads of physics and chemistry. As befits a department having had ranks of PhD's in its past membership, the main thrust of teaching was in the direction of separate sciences. In this, the department had a strong ally in the first head. However, the national trend towards "science for all" had pushed the department reluctantly into introducing combined science initially for Y7. A review document produced by the head of science in 1987 posed the question "we have always been successful at what we have done: why should we change?". The answer was couched in terms of responding to external pressure for change. By mid 1989, the focus in the department was entirely on implementing national curriculum science (which arrived on the scene before D&T). That, of course, was a combined science course rather than separate sciences. The opinion in the science department was that they were completely absorbed in implementing their own subject, and any contribution to technology would have to wait.⁹

The contributing departments: BS, CDT and HE.

In the mid 1980s the subject curriculum in Y7 and Y8 included "technical studies and home economics" (SG, 1985, p.1) and Y9 offered increasing possibilities for pupil choice and the "introduction of secretarial skills" (SG, 1985, p.1). In practice, this meant a

⁹ The evidence that emerged during the case study was that, at this local level, national curriculum implementation was forcing science and D&T apart simply because of the pressure on time required for each to set their own house in order.

progressive introduction to woodwork, metalwork and technical drawing for the boys and home economics and typing and shorthand for the girls. The "pupil choice" meant that a second modern language was offered as an alternative to technical or secretarial courses. In the early days of the school, as was common at the time, the differentiation by sex in Y7 to Y9, resulted in a similar division in Y10 and Y11, although some girls did take the available examination courses in technical drawing. Government equal opportunities legislation in 1975 meant that in this school, as in all others in the state sector, girls and boys had to experience home economics and technical studies. This requirement was put into practice in the late 1970s in Y7 to Y9 by means of a "circus" arrangement in which pupils in teaching groups moved round the various areas offered within technical studies and home economics. By 1989, the Y9 "circus" had been extended to include experience of business studies as well as CDT and HE. The activities experienced by the pupils moving round the circus were planned purely within the separate departments, and, in the case of CDT, essentially by individual teachers. The departments were physically separate in the school, as Figure 4.1 (below) shows.

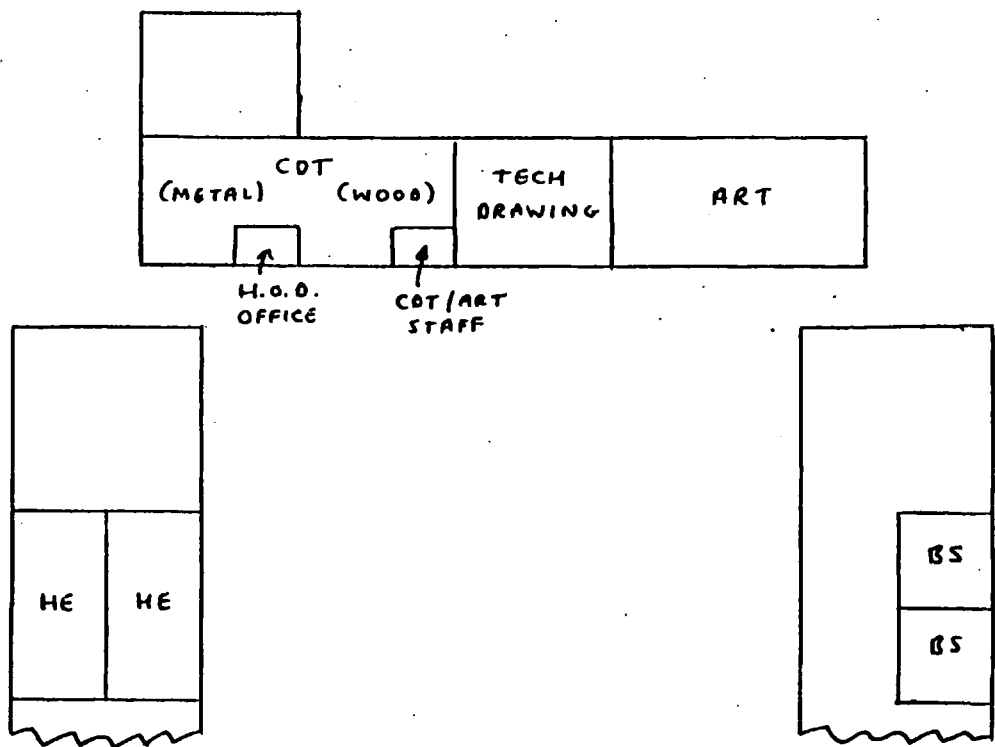


Figure 4.1 Map of relevant parts of the school building.

For each of the departments contributing to D&T I shall first give a general description followed by a brief introduction to the staff. I shall then give a flavour of the teaching approach in each department by giving extracts from syllabuses and examples of pupil activity drawn from the 1989 Y9 circus. I shall then identify issues other than the national curriculum that appeared to be of current concern in the department. Finally I shall characterize the department according to the description I developed in Chapter 3 (pp.108-109) from Weston (1979), and shall consider how this locates against the general development of each subject as outlined in Chapter 2 Section 3.

Business Studies

The BS department was itself in 1989 a new combination of previous separate departments of commerce (two full-time teachers) and economics (one full-time teacher). Economics was taught as an A-level subject only. The commerce department was originally established in the mid 1970s to teach shorthand and typing in Y10 and Y11 as mainly vocational courses, leading to CSE and RSA qualifications. The RSA certificate was the more vocationally-orientated and required a higher standard of shorthand. Pupils could go on to higher level RSA courses after leaving school. It was often the case that too many pupils would want to do the RSA course for the available spaces, so selection was done on the basis that the pupils showing most aptitude followed the RSA course and the others did CSE Office Practice which required less by way of shorthand. An A-level business studies course had also been introduced.¹⁰ The GCSE courses offered in 1989 were i) Typewriting, ii) Commerce and iii) Office Systems and Information Processing (OSIP). Where possible, teaching was done in parallel for GCSE and RSA qualifications. The accommodation consisted of two adjacent rooms in one of the main teaching blocks, one equipped with typewriters and the other with networked computers.¹¹ There was no

¹⁰ This has now (1993) replaced Economics, so in this respect there has been a rationalization *internal* to BS. Its only impact on D&T has been pressure on staffing D&T from the BS department.

¹¹ In 1989 the school possessed another computer network for general use. Responsibility for the development of computer literacy was not vested in the BS department. One member of staff outside this department had responsibility for coordinating information technology.

teaching below Y9 and the emphasis was still on the vocational nature of the subject. BS had retained an orientation to developing skills appropriate to vocational courses, whilst keeping up with developments in office practice such as the introduction of computer-based word processing.

The commerce department was a prime provider of courses within the one-year sixth form, which was previously mentioned as having been introduced to provide a vocational business-studies orientated post-16 course. The courses offered within the year were GCSEs in Business Studies, Sociology, Maths and English and RSA courses in Office Practice, Typewriting, Audio-transcription, Word Processing, and Computer Literacy and Information Technology. The BS staff were, consequently, heavily committed to teaching within this sixth-form course, having primary responsibility for the RSA courses in particular.

The head of BS, Sylvia, was appointed in 1975 as an instructor in commercial subjects, having previously been employed as a secretary. She was about to complete an arts-orientated Open University degree with the intention of taking a PGCE course for primary school teaching when she was persuaded to apply for the post at Uppgrove School on the departure of the previous head of commerce. She subsequently completed an in-service PGCE and became a qualified teacher and head of commerce. From being able to teach just the shorthand and typing, she set about developing her own knowledge and understanding to enable her to teach office practice. She has been involved for some years in the work of an examination board, and by 1989 was a chief examiner for that board's GCSE typewriting examination. Whilst she recognized the decreasing numbers of pupils entering for typewriting examinations nationally, she was also aware of a continuing strong interest in her own department's courses, not least because of their vocational nature.

Her colleague, Eleanor, was appointed as an instructor in 1981 straight from secretarial college. Her college course took in the basics of word-processing. She was specifically employed to assist in setting up the courses in the one-year sixth form, and subsequently

took an in-service PGCE. She had been keen on art-design work in school and said that she "had tackled repairs on the first car I owned" (TS). Eleanor made a particular point of going to the main staffroom at break times because she felt it kept her in touch with what was going on in the rest of the school. However, pupils tended to be in the department's rooms at lunch times which required some staff presence. Several other teachers with varying levels of expertise, would contribute occasionally to the filling of a timetable slot in BS when demand required it.

A flavour of the department's courses can be obtained from several sources. The sheet advertising the one-year sixth-form course¹² offered as its aim

to help pupils earn additional examination qualifications, to widen their understanding and experience of the world of work (including two weeks' work experience) and generally to improve job prospects in an adult atmosphere, which older students seem to enjoy (School document, 1991).

The aims of the Office Studies and Information Processing GCSE syllabus were:

- 1 To provide a broadly-based course of study which will be of practical and personal value to the student, and will provide a basis for further study.
- 2 To develop qualities of accuracy, adaptability and initiative.
- 3 To develop an understanding of the environment within which business activity takes place.
- 4 To promote a knowledge of office functions, systems and procedures.
- 5 To promote an awareness of developments in office technology.
- 6 To develop keyboard skills associated with modern office equipment.
- 7 To develop the ability to use language correctly and effectively in

¹² Information taken from the 1991 version.

the office environment (MEG OSIP syllabus for 1988 examination).

The BS contribution to the Y9 circus required pupils to go through a basic series of exercises aimed at introducing them to touch-typing on manual typewriters. They also had an introduction to the use of separate database, word-processing and spreadsheet programs on a "Nimbus" network: pupils working two to a workstation.

The main issues facing the staff were those of the rapid and continuing development of the hardware and software associated with office practice. Eleanor's own estimate of the situation was that she had been "running to keep up" (S) for most of her time as a teacher. Although the department had retained manual typewriters, it had also a set of electronic typewriters and its own Nimbus network. The practicalities of keeping the network running and of keeping up to date occupied the staff. I have already noted Sylvia's view that there was a continuing local need for the vocational skills taught in BS. Eleanor also commented, when she had been to visit her pupils doing their work experience in Y10, that she had been told several times by employers that the pupils could have had jobs then if the pupils had been available.

Several factors combined to make the commerce department (as it had been) a clearly-defined subject department: the focus on the one-year vocational course, the teaching of similar syllabuses in Y10 and Y11 with very little contact lower down the school, the similar origins of the full-time staff, the territory of the department clearly delineated by equipment in adjacent rooms. Under the first head's regime, communication generally had been mostly informal, but this had been easy in this department because "we would bump into each other in the store room" (Eleanor, TS). Therefore, in Weston's (1979) terms (p.98 of this thesis), the informal communication network worked well within this department.

The BS department of 1989 had inherited many of the characteristics of the commerce department with the economics teacher as an independent addition. At the time of the introduction of D&T, therefore, the BS department showed the following characteristics.

- The department was hybrid and transitional as regarding the relationship between commerce and economics.
- The BS department had inherited the emphasis on skills development below Y12 and Y13 with a strong vocational rationale. However, equipment had been upgraded with a dedicated computer network.
- There was quite a strong BS support network within the l.e.a. with an active advisory teacher. There were regular meetings, which, according to Sylvia, helped to compensate for the fact that BS teachers tended to be in small numbers in each school in the l.e.a.

Craft, Design and Technology

When the school was built, woodwork, metalwork and technical drawing were rapidly introduced into the curriculum as boys' craft subjects. Facilities and staff appropriate to these subjects were phased in through the 1970s as the school grew: the art and craft block being a separate block at one side of the school site. The transition from craft to CDT began to take place during the mid 1980s. In 1989 the CDT department occupied a suite of adjacent rooms, remote from BS and HE but still linked in a single block with the art rooms. The CDT area had rooms that showed their origins as woodwork, metalwork and technical drawing rooms, although some provision had been made for the teaching of electronics and there had been some minor adaptation of facilities as craft had changed to CDT. Several points are worth noting.

- Most of the rooms in the CDT area were linked with individual teachers and were referred to in general conversation as "so-and-so's room".
- Several of these rooms had a distinctive character, as much indicative of the style and personality of the person teaching in them as of the nature of the subject being taught.
- The small CDT-art staffroom had been frequented by the teachers of these subjects since the building of the block. It could almost be represented as an archetype of its kind. An assortment of chairs cramped together; the tea-making kit including a milk bottle with two holes punched in the cap; a weekly collection to cover the cost of brewing; general clutter within which

those with insider-knowledge could locate their items.

- The head of CDT had his own partitioned-off office within the main wood-and metal-working area. This doubled-up as a secure storage area and also housed the CDT department's most powerful computer.
- With the exception of one art teacher, the teachers working in this block were all male.

When the school was founded, the first boys' technical appointment was a woodwork teacher who soon became a deputy head and who had retired before GCSE CDT syllabuses had been introduced. His appointment was followed by that of a metalwork teacher (who had also left before the time of the study), then by Tom (woodwork/light craft/art) in 1973, Phil (technical drawing) in 1974, and Len (woodwork) in 1976. After some years of stability of staffing an electronics specialist was appointed (he was involved in the joint venture with physics into the Engineering Science CSE). He was replaced after a few years in 1986 by Peter, who was appointed as head of CDT. The most recently-appointed member of staff is Tony, who joined in September 1989. Therefore, with the exception of Tony, all the staff working in the CDT department in 1989 were appointments of the first head. They are a group of skilled craftsmen, each with considerable practitioner knowledge in particular areas of their own interest. They are introduced here in the order in which they joined the school.

Tom was appointed from college in 1973 to provide support in teaching woodwork and art/craft when the original woodwork teacher had become deputy head. His college training was in art and craft and included work with plastics as well as wood. He says of himself that he is not a woodwork specialist, and prefers to work in a range of materials. He has adopted the "design process" as his approach to teaching, feeling that this enables the use of a range of materials. He prefers to teach pupils in Y7 to Y9 but does contribute to teaching GCSE CDT: Design and Realisation. His interests include history, art, music and photography, and his teaching role in the school is not purely within CDT. He is able to help out with junior art teaching, and provided the photography option when it was needed within the curriculum and option framework favoured by the first head. His self-

declared emphasis about the job of teaching is that "pupil contact time is what teaching is all about" (TS). He helps with the running of young people's swimming clubs in much of his spare time. Tom is the only member of the CDT-art staff who does not frequent the CDT-art staffroom:

It's a no-smoking area - conversation doesn't give you a break - I need a chance to recharge. Also in the [main] staffroom you get a chance to hear what's going on ... I miss some organizational things [in D&T] so I sometimes have to rush things through" (TS 5-7-90).

This means that Tom has a slightly looser connection with the rest of the CDT staff, and he has his main circle of friends in the main staffroom, where he sits in the social circle also frequented by Eleanor of BS.

Phil was appointed in 1974 to teach technical drawing, having previously worked in a local general engineering company as well as teaching for a time elsewhere. His teacher training was a three-year college course in handicraft/art-and-craft. He introduced A-level technical drawing and subsequently A-level Design, when the department was essentially a traditional woodwork-metalwork-technical drawing one. He changed to the design A-level because he wanted to retain an A-level subject within the department when it appeared that technical drawing was losing its currency. In 1989 his particular responsibility was for teaching GCSE CDT: Design and Communication and he shared the A-level design teaching with Peter. Phil associates himself particularly with the technical drawing/graphic design subject community: "graphic design is as important as product design - you see it all around you" (TS). Rather like Tom, he sees pupil contact time as his central purpose: "my main concern is standing in front of the class teaching - that's what I enjoy - that's what I'm good at" (TS). Despite this view, he is also the school's examinations officer. His own practical skills extend well beyond the technical drawing domain.

Len was appointed from another school in the area in 1975 to teach woodwork, as the school grew in size. The first head considered Len's appointment a successful piece of head-hunting. He now teaches CDT: Design and Realisation, mainly in wood but with

some plastics. The working of wood is his great passion. Len left school at fifteen and spent five years as a joiner's apprentice which included attendance at night classes at the local technical college which gave him a City and Guilds qualification. After two years' national service he went back for three years to the firm where he had been an apprentice. The government of that time were actively seeking craftsmen with his qualifications to become woodwork teachers. He was appointed to a school after brief training and stayed in that job for sixteen years before moving to this school. He is convenor of the school's Health and Safety committee.

Peter was appointed from another local school in 1986 as head of CDT. His previous appointment was as a head of CDT, but in a smaller department. The move gave him a promotion, and his appointment was at a time when the CDT department needed to complete the transition to the teaching of CDT GCSE syllabuses. So he had already worked with the more long-standing members of staff in implementing these examination requirements. He has a range of craft skills but also specializes in electronics and IT. He trained in the late 1960s "when the design approach was just starting" (TS), doing art as his second subject. However, once in teaching he "made a conscious decision that technology¹³ was the coming thing so for two years I went on every course that was available" (TS). In 1989 he was teaching one physics group, and he had previously taught art, but his main teaching commitment is in CDT: Technology and A-level design. He turns his hand to various craft and constructional activities but prefers to keep his own woodworking as a recreational activity.

Tony was appointed as a probationer in 1989, having re-trained from a career as an artisan in the metal construction industry. He had left school at fifteen with no qualifications. He is in his early forties and had, therefore, committed himself in mid life to gaining entry to and studying a four-year B.Ed course. So, despite being a probationer, he has considerable life experience. Although employed for many years in the construction industry, his

¹³ By which he meant the content associated with the CDT: Technology syllabus - structures, electronics, mechanisms, etc.

interests are very much at the boundaries of art and craft, rather like Tom's. He is interested in folk music and in the crafting of some kinds of musical instruments.

All the members of the CDT department are in their 40s, with the exception of Len who is in his 50s.

Several of these teachers (Tom, Phil and Len) had been used to working very much as individuals in the CDT department - each in their own room and in their specialized media. In their own ways, Len and Phil favoured one medium and felt most comfortable teaching within that. They had both occupied "their" rooms since they had started working at the school. The ethos of the CDT department was certainly of individuals working in parallel, each keeping within a fairly clear boundary. Peter had begun to address that issue, as I shall show in Chapter 6 when I consider the nature of the CDT timetable for the year. But there was no significant experience of working as a *team* within CDT when the requirement to start cooperating with BS and HE came out of the blue in 1989.

The nature of the range of GCSE examination courses offered in CDT provided a downwards influence on the curriculum offered in Y7 to Y9. For example, each of the three GCSE syllabuses included a description of the "design process" (Figure 4.2), and the "stages of design" were used to structure work in the lower years.

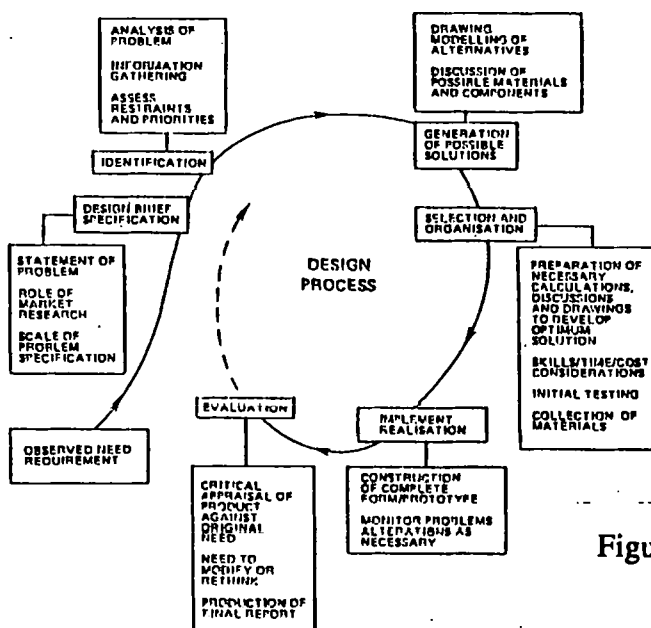


Figure 4.2 Design process as described
in GCSE CDT syllabus.

All the CDT GCSE examinations gave marks for coursework (30-50%), the "design process" being translated into some of seventeen "assessment objectives".

The emphasis in Y7 to Y9 was on pupils learning skills and becoming familiar with the design process through mini-design activities. The following examples of pupil activities drawn from the Y9 "circus" give a good indication of what was being offered in the six-week spell that pupils experienced in the various areas. They indicate some divergence within an intended common approach of a design-based but skill-developing mini-project.

Metal¹⁴ (taught by Tony)

Pupils were required to design and make a small ornament having a mild steel base and a freely-designed top. The dimensions of the base were specified and had to be turned to size on a lathe from a given steel cylinder. The top of the ornament could be made from a range of materials including plastic sheet, cardboard, wire, metal rod, and most other "found" materials. In theory, therefore, this combined a set piece of lathe-work, introducing turning skills, with an opportunity for some free design. Although the top part of the ornament had to be "designed" on paper first, it is fair to suggest that this was more an exercise in free expression than in technological design. What often happened in practice was that Tony would allow pupils to introduce variations on the design of the base if they wished. He was more concerned at this stage that each pupil should make something that satisfied them, rather than insisting on achievement of the rigid specification, favouring creativity and free expression rather than accuracy to a specified form. Sometimes the pupils would find difficulty achieving their intentions for the top half (which was "designed" on paper first) within the constraints imposed by the material they had chosen. This was an example of the skills of working various materials being required on a need-to-know basis. Unfortunately, Tony was often engaged in teaching a pupil how to use the lathe when other pupils "needed to know" how to solve a problem of working

¹⁴ The designations given are those that appeared on the staff rota for this Y9 circus in October 1989.

with another material. Tony felt that on balance he would rather have them with this problem than face them with a prescribed construction activity to which they had to adhere rigidly.

Wood/plastics (taught by Len)

Two independent tasks were set here. The first was to make out of perspex a holder for a boiled egg. The intention was to enable pupils to practise basic plastic-shaping techniques. The second task was to assemble and finish a plywood bird-nesting box to a given plan from parts that were pre-shaped. There was little element of design in either of these.¹⁵ Len's reasons were quite clear to him, and reinforced in his view by some of the wastage of material and inappropriate use of tools that he observed on occasions in Tony's more open-ended approach. Len wanted the pupils to succeed by engaging in well-proven tasks over which he had complete control; to have something worth taking home, and to do it without wastage of valuable material.

Technology¹⁶ (taught by Tony)

Pupils were required to etch and drill a printed circuit board and then solder components to it to form a standard one-transistor moisture detector. The use of a digital voltmeter and power pack was required. Despite some attempt to couch this in terms of a design process, it was basically an exercise in following a recipe and developing certain constructional skills. There wasn't much time in the six weeks to develop in any depth the linking of circuit diagrams, understanding of what was going on, and component layout on the circuit board. However, the vast majority of the circuits worked, which satisfied the pupils.

¹⁵ I got an interesting perspective on Len while I was observing an HE lesson. Two boys arrived in the room wanting an egg. On being asked why, they said that Sir (Len) had told them if they wanted to find out how big an egg was, they could go and ask in HE. It turned out that they had actually raised the question of the size of the hole specified in the perspex. Len had clearly decided that this was a moment to engage his HE colleagues in some "teamwork". When the boys returned to Len's lesson they discovered he only had a limited range of sizes of hole-cutter anyway. Len had chosen not to disclose that information to the boys in advance of their *sortie* to HE.

¹⁶ This designation in itself indicates the view of the nature of technology within CDT: that associated with the *knowledge* content of the GCSE CDT: Technology syllabus.

Graphics (taught by Phil)

Pupils were required to complete a series of technical drawing exercises designed to give them experience of basic orthographic projection techniques. There was no pretence of a "design" approach: this was pure and simple skills development. However, as Phil reflected in conversation, the skills were intellectual and to do with conceptualization as much as about using pencils correctly. Phil was much of the opinion that the design work could come later, once the necessary skills had been developed.

The above accounts indicate that a particular issue in the CDT department was the conservatism shown by some of the staff with regard to the value of the design approach and the introduction of skills. In terms of pedagogy, this conservatism showed itself, for example, in Len's unwillingness to allow freedom for his pupils to design. This conservatism is complex and will be investigated further in following chapters that consider how staff responded to the arrival of D&T. Even regarding the implementation and timetabling of CDT courses (as opposed to craft and even before the complication of D&T arrived), it posed some problems, as the next chapter will show. Quite apart from individual conservatism, the felt need to get pupils to use the design process led to activities sometimes being forced into an inappropriate format (such as the moisture detector, which was actually a straightforward making task).

A further issue was the nature of the facilities available for the teaching of CDT. Although there were enough rooms, these still showed their origins as woodwork and metalwork rooms, with an excess of some kinds of metalworking equipment and limited space for the necessary design work. For example, when a new computer and graph plotter were obtained for the introduction of computer-aided draughting, it had to be installed in Peter's office. When he subsequently tried to demonstrate its use to a whole teaching group, the result was reminiscent of attempts to fit as many people as possible into a phone box!

At the time of the arrival of D&T, therefore, the CDT department had the following features:

- It had some attributes of a subject department, not least a very clearly-defined territory and a consistent set of three examinations all following the same general criteria. There was also the successful A-level subject that put on high-profile displays in the school and whose outcomes consistently got attention beyond the school.¹⁷
- It was still in transition from its previous existence as a boys' craft department, and its members had widely divergent views about the coming-together of the three aspects of CDT. The overall impression is of individuals operating in parallel resulting in a hybrid department. The individual members represented various interest groups - favouring skills development, a generic design process, etc. and also with leanings to utilitarian (e.g. Len) or academic (e.g. Peter) traditions.
- The normative use of language in the department indicated that the words craft, design and technology tended to be used to describe, respectively, the manual skills of working with materials; a generic process of moving from intentions to realisation; and the subject content associated with the CDT: Technology syllabus.
- The CDT department operated with a generally successful informal communication network based on the common use of the CDT-art staffroom. Tom was the member most likely to miss out through not being a regular member of this common forum.

This department was not untypical of CDT departments all over the country (Penfold, 1988). However, Peter (who had a good grapevine of contacts through his moderating work) did observe that he felt that many schools in the county had progressed rather further down the road to integration than this one. Issues that had been half tackled in the transition to CDT seemed likely to emerge more forcibly in the circumstances required for D&T implementation, where CDT would have to make a bigger transition to cooperating with other departments.

¹⁷ For example, a school document of 1992 indicates work selected for several years running for display in a regional show.

In 1989 the HE accommodation was essentially that which had existed throughout the school's life. It consisted of two adjacent rooms, one set up primarily for work with textiles and the other for food, with regular use of a third room that had conventional tables but was suitable for work with textiles. Between the two main rooms was an area that served as the storage space and office base for the HE staff. In 1989 there were three full-time and one part-time HE teachers, all female. Although each had personal interests in narrower aspects of HE (particular textiles or foods), they would each teach whatever aspect of the subject was required. Use of the rooms by staff was, therefore, more flexible than in the CDT department, and rooms were not identified with individuals. Three GCSE courses were offered: HE: Food, HE: Textiles and HE: Childcare. An A-level course had been run in the past but had attracted too few students to be viable in 1989.

Joan is now head of HE, having been first appointed from another school as an assistant teacher in 1973. She trained as an HE teacher, on a certificate course. She is now in her early 50s and settled in the area. In the days of O-levels she worked for an examination board as a practical examiner. Her own particular interests are in work with textiles, and she keeps up to date with developments such as micro-processor controlled sewing machines.

Alison returned to full-time teaching in the school in 1985, after previous teaching experience elsewhere. Her training included a home economics degree and she was studying for an M.A. in education in 1989. She is in her late 30s and was thinking in terms of eventual career development to deputy head. She has a broad interest in the arts.

Jenny was a probationer on a one-year contract in 1989. The staffing requirements for 1989 had justified a third full-time HE appointment, but this need did not extend beyond the one year. Now in her early 30s, she took a degree in home economics and had worked in industrial catering for some years before doing a year's PGCE immediately prior to this appointment. In the summer term of 1989 she was seeking, and obtained, a new and

permanent appointment with another l.e.a. from September 1990.

The part time member of the department was Mary, who was returning to teaching. In September 1990 she obtained a full time appointment at another school.

The broad "Assessment objectives" for all three GCSE HE examinations are identical (as below) and show similarities with CDT, inasmuch as there is a focus on processes, even if these are not named as comprising an overall "design process". It is noted in the syllabus that "practical work is assessed on objectives 3, 5, 6 and 7".

- 1 Identification of needs and inter-relationships.
- 2 Recall, selection and application of knowledge and use of experience.
- 3 Investigative procedures.
- 4 Justification of, and identification of priorities.
- 5 Planning and organization.
- 6 Execution of proposals.
- 7 Evaluation of course of action.

(MEG syllabus for 1988 examination)

This indicates how the approach in which pupils investigate the solutions to practical problems had become significant in the teaching of HE. The following HE contributions to the Y9 circus of 1989 provide examples of the work done by pupils.

Home Economics: Food (taught by Joan)

The St Ivel "silver award" scheme is followed, which requires pupils to select one person and analyze their dietary requirements. Various dishes are prepared during the six weeks, and in the final morning of the module each pupil has to prepare and set out a meal as planned for the selected person. A computer program is available on the one machine in the department which provides information about the nutrient content of foods. The pupils

selected a range of people from young siblings to elderly relatives, and were thoroughly engaged by the activity which obviously caused considerable interest in some of their homes.

Home economics: textiles (taught by Alison)

Pupils were required to create a garment for themselves, which must be demonstrated during a "fashion show" in the final morning. There is great flexibility for those who have garment making skills to go beyond the basic requirement. Pattern-making, textile cutting and decoration are all required techniques. The range of products was considerable, with considerable skill being shown by Alison in helping those with limited experience to choose a garment that they could make successfully.

Whereas in CDT there was considerable flexibility of interpretation by individual teachers of general requirements, the teaching matter of HE in Y7 to Y9 appeared to be much more the result of mutual planning and agreement. Joan and Alison had spent many hours working together to evolve a system of teaching appropriate to the demands of GCSE and the consequent approach in Y7 to Y9, and had become particularly close colleagues. Although they each had their own teaching styles, they were quite likely to be using the same printed material. There was a sense of collegiality in the approach of Joan and Alison that did not feature in CDT. This mutually-agreed and achieved attention to detail was noted in conversation by the first head as being a characteristic of the department. Jenny observed once that she found it a bit difficult to create her own space in a system which "seemed to have everything buttoned up" (TS), and this does contrast rather with the experience of Tony in CDT who found plenty of opportunity to bring his own ideas into the work he did in Y7 to Y9 (for example the metal-based ornament was his own suggestion). Alison observed of herself that she needed to plan and prepare thoroughly: "I have to be in control of what I'm doing ... I have to know what's going on" (TR). Whilst this was a personal characteristic of Alison, Joan also appeared most comfortable with a system whereby teaching and assessment materials were prepared in advance in considerable detail.

There was a latent issue within HE about the teaching approach which was being adopted: it related to the balance between pupils doing investigative or design work and practising skills. It was Jenny who felt most keenly that the balance should be tipped back towards skills, and she left for another job at the end of the 1989-90 school year, so the issue remained latent.¹⁸ Joan had obviously had to come to terms with the issue herself, as the following extract shows:

It's much more interesting the work that we do now than it was a few years back when everybody did the same thing ... much more challenging because you're learning with the children. A few years back you would say that all second years are going to make a - whatever. You've got certain techniques that you have to teach them ... so you build whatever skills you need into an object ... and you teach through it in stages. If you want very high skilled work that's the best way to do it so you're turning out an excellent product in the end. But the children are not really thinking as much as they do now ... now in the second year you tell them that they have to make a holder for something ... *what* is up to them ... you've got a class of 22 children and every single person is doing something different. What you get at the end is not a highly finished product ... I didn't like it at the beginning but you get used to it. The process is more important than the final product ... I think I'm convinced of that. It was always difficult to get children to produce a finished product that was really good ... some of them ... but that was the be-all and end-all so if you didn't get there it was total failure from my point of view ... now you've got all the lead-up to it and you've actually learned quite a lot along the way [Showed me a camera case with which the girl was "highly delighted" even though it wasn't perfect.] She's worked out loads of problems ... she's gone away satisfied. (TS)

Like many HE departments around the country, this one had made the transition from the earlier pedagogies of skill development in the making of garments and the preparation of food to that associated with the GCSE set of examinations. There was a certain ambivalence that related to the value of the subject as perceived by its teachers, and the

¹⁸ When I interviewed Jenny in July 1990 she compared the situation in her prospective school with that in Upgrove School, feeling that Upgrove School had moved too far from skills development. Had she stayed at Upgrove, the issue would clearly have become one that she needed to confront.

status ascribed to the subject and the department in the school. The following extract indicates how this was expressed by Joan.

"CDT and home economics are fairly equal ... in that they're both practical subjects ... and we work in similar ways ... you have ... the academic aspect. People don't give the subject [HE] the due respect it deserves ... you can flog yourself to death and it's still 'the cookery department' ... I find that extremely unfair because we actually do a lot of hard work for a lot of children who do very well and enjoy what they're doing ... I don't think home economics is less academic than any other ... the children have to work extremely hard ... you can't just waffle around and make an apple pie and come out with an "A". Whatever aspect of home economics you do is part of the life you're going to lead when you leave school (TS, 6 July 1990).

The issue of the status and value of the subject has been the subject of national, as well as local, debate, as I showed in Chapter 2. This is the evidence of its local manifestation in this school. It forms part of the context into which D&T arrived, and it was an issue about which I heard more in HE than in the two other departments. It is reasonable to suggest that this was a consequence of the perceived threat to HE which was not felt in the same way in BS and CDT. Also, in this school, HE was the only one of the three departments not actively engaged in working with pupils in Y12 and Y13. By comparison with CDT, the job of head of department also attracted a lower pay scale and the department was smaller than CDT.

The department's circumstances may be summarized as follows:

- The HE department showed the nature of a subject department because of its territory, links maintained with a county and national subject interest group (NATHE), and a collegial approach on the part of its principal staff. In this respect it had a much clearer identity as a subject department than CDT.
- Communications between Joan and Alison were informal but highly-developed, whereas Jenny and Mary found it less easy to engage in debate.
- The transition to the approach required by GCSE had been accomplished,

and the two permanent members of staff were agreed as to the teaching methods that should be used.

A summary of the situation in Upgrove School into which the national curriculum arrived

Many of the staff of the school were used to working in a situation in which they were protected from unwanted change by the gatekeeping of the first head. They were used to working in small, autonomous departments, and minimal structures for administration and formal negotiation. The school's deputy heads were all long-standing appointments or internal promotions of the first head, and many staff had worked in the school for ten years or more. Figure 4.3 (below) summarizes the service records up to July 1990 in this school of the staff of the BS, CDT and HE departments.

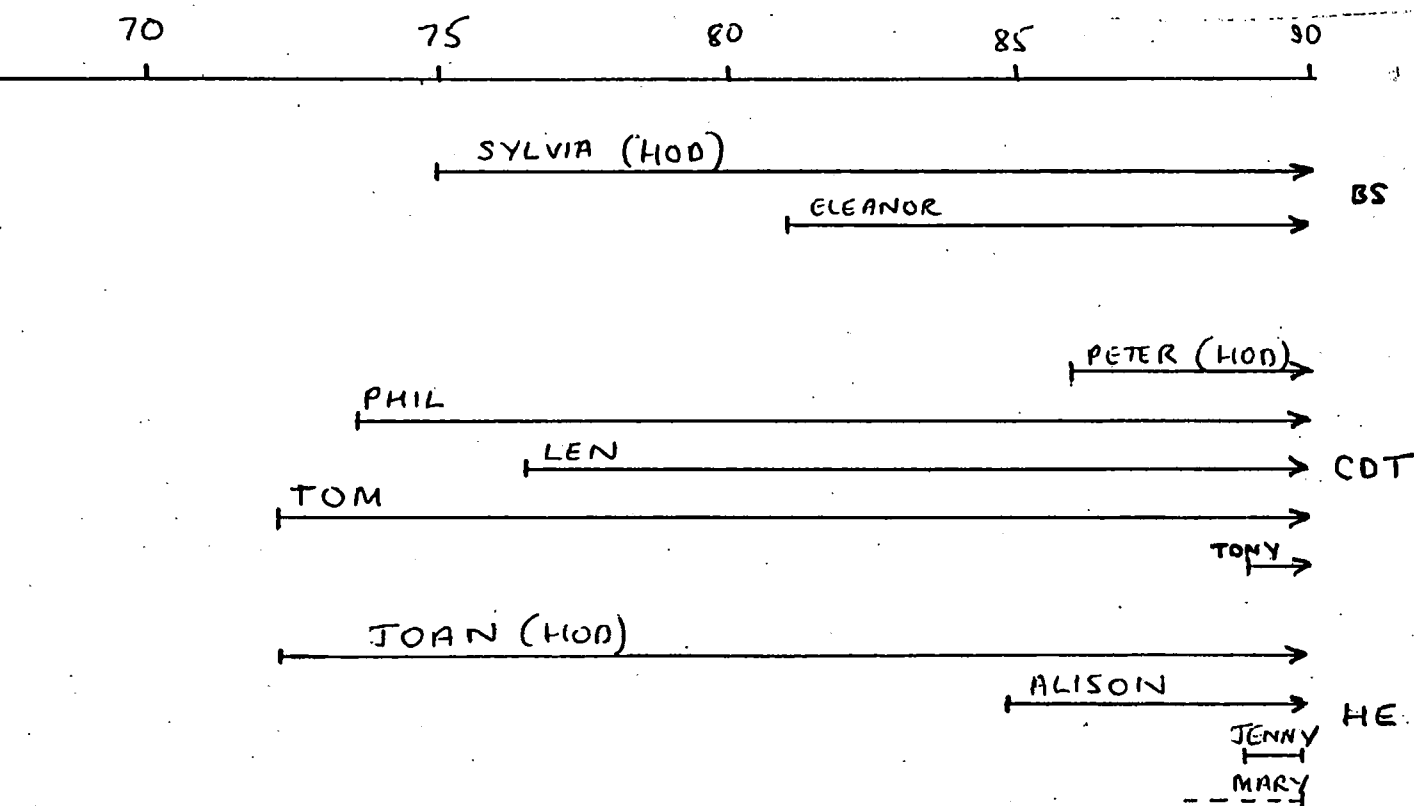


Figure 4.3 Duration of employment of staff of the BS, CDT and HE departments.

The school had successfully adapted to the introduction of GCSE, but had resisted other initiatives having less coercive force. The nature of GCSE was, in any case, felt to be consistent with the school's principle of maximising entry to academic examinations. Heads of department were used to informal and private negotiation with the head for funding "at the margins", and were expected to trust him that all was kept fair over the years. Information about points of responsibility for staff was not generally in the public domain. The rules of micropolitical encounter were understood and negotiation of most aspects of running the school was informal. The culture of the school tended to inhibit response to externally-required change.

The BS, CDT and HE departments showed characteristics that exemplify the situation the the first head had set up. Each department had been expected to work out its own salvation in terms of developing teaching strategies for the range of pupils taught, and to respond to changes (notably the introduction of GCSE) in its own area of the curriculum. Each department had a clear sense of territory, and of being a subject department, although each had a different degree of internal variation of views about the nature of the subject. In each case informal, rather than formal, communications were the norm. The 1991 l.e.a. document (based on a survey of initial D&T implementation in the l.e.a. schools) noted that:

the tradition of Design Faculties in the majority of l.e.a. schools which has created "federations" of Art and Design, CDT and Home Economics teachers gives schools in this County a strong base from which to build the holistic approaches for team delivery envisaged in the Order for Design and Technology (l.e.a. document, 1991).

In Upgrove School there was no such federation. The teaching of pupils within the circus approach in Y7 to Y9 was independent, with each department having absolute control over what was taught to the pupils and, therefore, teaching very much with a mind to preparing pupils for the separate GCSE subjects in Y10 and Y11. I have no direct evidence of the actual situation of the "federations" in other schools in the l.e.a. However, Peter, who had good contacts with schools in the l.e.a., did confirm that the situation at Upgrove School in

terms of developing a coordinated approach tended to be less federated than many other schools within the county. He had come to Upgrove School from another school in the l.e.a. where he had worked in a smaller but open-plan faculty consisting of Art, CDT and HE. He found the situation in Upgrove School different because of the self-contained, autonomous departments. The need for cooperation simply did not exist.

Following nationwide developments in the nature of 16+ examinations in their subjects, CDT and HE had both had to come to terms with moves within their own subjects away from a craft-skills based approach to, in the case of CDT, the design process orientated approach, and in the case of HE an investigative approach. The impact of the introduction of GCSE in Y10 and Y11 also affected the teaching in the lower years, because staff wanted to introduce their pupils to the "GCSE" way of doing things. Whilst BS in this school had no intentions in moving from a skills-based vocational orientation (although there had been updating of equipment to include the computer network), CDT and HE had both experienced some reorientation as their subject interest groups at national level sought to change the nature of the subjects. Inevitably, such a change in the nature of the subject matter and the approach to teaching had brought tensions within the interest groups of the subjects generally, as well as in this school (as in most others). I have noted the debate in CDT and HE between those favouring skills development and those favouring an approach focused on either an investigative approach or the design process. Such debates had taken place within departments before the introduction of D&T, and remained live during its implementation.

Despite such changes internal to each department, up to the point when proposals about the national curriculum began to emerge, each of the three departments had sound reasons for believing that its place in the departmental structure of the school, and its contribution to the subject curriculum of the school, was secure. That security was based not least on numbers of pupils opting to do the subject at GCSE level. For BS there was also the security of the one-year sixth form course, and for CDT and HE there was the need to teach all pupils in Y7 to Y9. The departments showed features as follows:

- They all showed some features of *subject* departments. They had clear and separate territories that delineated them from each other and the other departments in the school.
- CDT was more apparently a loose grouping of individual specialists than HE and BS. CDT showed the most signs of being in transition and hybrid, because of the range of backgrounds of staff, the potential within CDT for different emphases on the development of skills, knowledge and processes, and the range of content from woodwork to electronics and computer-aided design.

4.4 Summary

This chapter has described the situation in one school into which the national curriculum in general and D&T in particular had to be introduced. The chapter has begun to confirm the validity of the fifth hypothesis – that schools, departments and teachers have characteristics that affect the change process. This school generally exhibited characteristics that had resisted externally-required change, and many individual members of staff had been used to working in small departments concentrating on a particular subject. The historical reasons for this situation have been explored, in order to establish why the situation was as it was and to provide a basis from which to begin to explain the reactions of individuals and departments to the national curriculum. The next three chapters of the thesis now consider the process of change that took place in order to implement national curriculum D&T in Key Stage 3.

5 Facing change: September 1988 to July 1990

5.1 Introduction

Chapters 5 to 7 recount the change process that took place when the national prescription for D&T had to be implemented in the context of Uprove School. In recounting the change process the nature of conflict between subject interest groups at school level (hypothesis 3) will be further explored. The evidence will begin to emerge that the need for an appropriate national change strategy was not recognized (hypothesis 4). The impact on the change process of the particular circumstances within this school (hypothesis 5) will become apparent.

This chapter considers the initial response to the national curriculum in general and the proposals for D&T in particular that took place in Uprove School from the point where the present head took up his post until the end of the summer term 1990. This is, therefore, the account of the initial response in Uprove School to the national developments that were recorded in Chapter 2 section 3. Section 5.2 considers the general changes to the management and structure of the school that were initiated by the present head with a view to supporting the implementation of the national curriculum. This is followed in section 5.3 by an account of the initial responses of individuals and departments planning for the first year of implementation of D&T.

5.2 General preparations for the national curriculum

Establishing a school structure to promote change

The present head took up his appointment in September 1988. He had previously held a deputy headship in another I.e.a., and had worked for a short period in an advisory capacity within a sixth-form reorganization in the I.e.a. containing Uprove School. On his appointment as head he was aware of the circumstances of his arrival, inasmuch as he had been given enough information about the situation in the school to know that he had a fairly large task on his hands. He was able to spend the summer term 1988 making regular

visits to the school while the first head was still in post, so was aware of the high profile, firm convictions and style of the first head. He was charged on appointment by a member of the l.e.a. with being an "agent of change" (NR) in the school. He felt that he was accountable within the l.e.a. but "ultimately to the pupils" (NS) for making sure that the school did respond to the new requirements under the 1988 Education Reform Act. Whilst being aware that he would want to run the school rather differently from his predecessor, he had no basic disagreements with the first head's priorities about the environment he wanted to create for pupils. On his appointment, the present head had decided that several phases of action were required - the first to be a restructuring of the departments and the way in which the school was managed, and the second to be a focusing on the development of schemes of work appropriate to the national curriculum. His view of the government's change strategy was that it was "command-obey" (NR), giving no option but to implement the national curriculum. This illustrates the power-coercive nature of the government's strategy as it was felt by this head - he had no option but to pass on to his staff the requirement to implement the national curriculum in the school. However, he was determined to set up a structure for handling change in the school that would require staff to negotiate formally within and between departments.

He had very little time in which to set up this structure. Part of his approach was to make the school-level decision-making process apparent to the staff, and to attempt to engage them in it. The structure that he envisaged as supporting the implementation of the national curriculum was set out in two internal school documents.¹ The first document was prepared and circulated immediately after a staff meeting at the end of February 1989 at which the head had presented the scenario facing the school and some initial ideas that had emerged from in-school discussions. Entitled "Managing change (1)" it set out proposals for changes to the departmental structure as well as proposals for a regime of regular meetings. The second document ("Managing change (2): Planning for the future") was a

¹ Copies of the documents were given to me by the head and were subsequently discussed in a noted interview.

booklet containing more detailed draft proposals and job descriptions which he circulated to staff in advance of a staff meeting to be held in mid April 1989, at which these draft proposals could be discussed.

These documents provide evidence of the way the head was intending to handle the change process - first simply in terms of their existence as documents for discussion by staff and second because of their content. The staff found themselves confronted in the space of half a term with more on paper about the management of change in the school than they had probably received in the previous twenty years. Whereas the first head's Staff Guide was an initiation for new staff into an existing system: these documents were meant to engage staff in the process of establishing a structure for implementing change. The documents (as will shortly be shown) had a rational style which assumed that if views were fully set out they would be responded to in like fashion. However, what also emerges is that the approach to the change process does show evidence that the head appreciated the need for a normative-re-educative strategy. A head who had been an effective gatekeeper had, therefore, been replaced by one who not only appeared to some staff to be opening the gate (although he had no choice), but expected the *staff* to deal with the consequences of the gate being opened. Not only that, but the staff found themselves with paperwork to read, all of which constituted an instant information overload when contrasted with the minimal paperwork approach of the first head. This inevitably caused some comments on the part of some long-standing staff. Len reflected that "our old head would have had none of this" (S). Sylvia was more willing to accept the necessity of coming to terms with the national curriculum, but even so felt that the first head would have managed it without so many meetings. There was certainly a feeling around that the new head had gone overboard regarding the number of meetings, which was a feature of the staff's response likely to subvert the head's intentions to engage the staff.

The February document shows that eight curriculum areas were envisaged as in Figure

5.1 (below).² At this stage art is shown as possibly being included in D&T or Expressive Arts. Figure 5.2 (below) shows initial thinking about the range of GCSEs likely to be offered within each curriculum area: the figure of one in the D&T area foreshadowing a particular problem that will be discussed later in the chapter.

<u>Curriculum Areas</u>	<u>Staff</u>
1. English Drama Media Studies	10
2. Maths	12
3. Science Biology Chemistry Physics Rural Science Geology	16
4. Languages French German French Studies	9
5. Humanities History Geography RE Economics	14
6. Design & Technology Home Economics CDT Art Business Studies	11
7. Expressive Arts Music Art Dance Drama Media Studies	8
8. Physical Education PE/Games Dance	6

Figure 5.1 Intentions for setting up eight curriculum areas.

National Curriculum - a preliminary sketch

Maths	Eng	Langs	Science	Humanities	Exp Arts	PE	SAVE	D&T		
1	1	1	1	1	1			1	7	Range of GCSEs
1	2	1	2	3	1			1	11	

Figure 5.2 Initial thinking about the range of GCSEs to be offered.

² Figures 5.1 and 5.2 were included in the document but had first been presented as OHPs in the February staff meeting.

The February document makes significant statements about the way the head envisaged the new structure of curriculum areas in operation. The curriculum areas would each have a **convenor**: these convenors meeting regularly with their own curriculum area staff and also together in a **curriculum group**. There would also be **cross-curriculum coordinators** who would meet with representatives of each curriculum area and also in a **coordinators group**.

The document then stated:

Different combinations of staff will be involved in the following teams and groups:

a) All staff are likely to belong to three different teams:

- i) Curriculum area (and departments within that)
- ii) House³
- iii) Cross curriculum

b) Deputy Heads⁴ will form the deputies group and will be responsible for the day to day running of the school.

c) INSET group

d) Other groups (e.g. primary school liaison groups) will continue as now; yet others will form, work, disband as appropriate, but the above will form the core.

(Internal school document, February 1989)

³ The pastoral system of form tutors is based on houses: form tutors being responsible for carrying out Personal and Social Education and Careers Education with their own forms.

⁴ The school has three deputy heads, all long-serving appointees of the first head. Their involvement in the process of change is considered later in this section: the statement here is an initial indication that their concerns were not to be primarily to do with implementing change.

Various other points were made in the February document and, as they formed the basis of the head's approach, selected extracts are presented here:

Meeting schedules

It will be important to plan the school calendar carefully - none of us wishes to have an overburden of meetings and we must avoid bunches of meetings, exams, parents evenings all coming together. I suggest as a starting point

Termly: Heads of Department

Half termly: Cross curriculum groups, Coordinators group.

Monthly: Curriculum areas, House teams, Inset group, Heads of House.

Fortnightly: Deputies, Curriculum group.

Although all these meetings will be scheduled, they will only take place *if needed* - no point in meetings without purposeful agendas and outcomes.

Department meetings and whole staff meetings should occur as now: as and when needed.

Meetings will normally take place at the end of school. One reason for the lunch hour being shorter is to enable this to be more convenient.

Attendance at all meetings will be voluntary; each meeting will therefore have to be relevant and address the interest of those attending; and each meeting will set its own agenda ... Each meeting will make its own decisions ... thus the role of the person writing the agenda, calling and chairing each meeting, will be crucial.

I expect - we should all expect - this structure to evolve and change in the light of experience and circumstances. It is not a blueprint but a starting point.

You may be asking why we have to change at all!

i) I work most efficiently in teams; I believe we all do. Teams need to meet.

ii) I could implement the National Curriculum by dictat. I am only providing - perhaps by dictat! - the structure within which we, the teachers, will implement the changes.

iii) We have to be ready to meet the changed power relationships brought about by Local Management of Schools (devolved budgets) and the new powers of Governing Bodies. These latter are very wide. I have no crystal ball, but I wish us to be ready to meet, flexibly, demands made on us.

(Internal school document, February 1989)

The evidence is that, although the head was pushing for the establishment of a structure that promoted rational discussion, he was also aware of needing to engage the staff from their existing normative expectations. Meetings were to take place if needed: the emphasis was on working in self-regulating teams. There is also one little inclusion in the document that indicates at least the response of one person (Phil, the draughtsman) to all this, as well as demonstrating the head's willingness to interact with staff:

From the staff meeting, what sticks most in my mind is Phil's query about where all the teachers have gone in this welter of new meetings/groups/teams/coordinators/convenors! They are under there somewhere, Phil ... (Internal school document, February 1989)

The new regime can be contrasted with the previous one through the following quotation from the first head's staff guide:

We usually have two staff meetings per term, after school. We encourage a 5 o'clock finish to concentrate the mind. An agenda is put up on the staff notice board a week before the meeting to which any member of staff can add issues they wish to air ... many decisions of fundamental importance have been taken at such gatherings ... There are in addition various meetings taking place in school time ... but I think it is true to say that we work on a happy minimum of such encounters (Staff Guide, 1985).

Several proposals from the subsequent April booklet indicate how the initial thinking from

the first document was being consolidated. The same eight curriculum areas were identified: five of these had existing overall heads of department (Languages, English, Maths, Science, PE) and three were described as "new areas of cooperation" (Expressive Arts, Design and Technology, Humanities). Each curriculum area would require a convenor on a one- to two-year temporary appointment from September 1989. It was made clear that the convenor need not necessarily be a head of department. Heads of subject departments (e.g. BS, CDT, HE) would still exist within the amalgamated curriculum areas. The convenors were:

To represent the views of and take decisions on behalf of a curriculum area at curriculum group meetings.

To coordinate work within the curriculum area.

(Internal school document, April 1989)

The curriculum group formed of the convenors was, therefore, an important formal forum in which decisions affecting members of staff would be made.

Each of the ten "cross curriculum threads and areas" (e.g. *Economic and Industrial Understanding* and *Information Technology*⁵) needed a coordinator: four were named as already in post (including EIU and IT, neither being staff likely to be included in the D&T curriculum area) and the others were advertised as vacancies for a three-year temporary appointment. The coordinators were:

To work with representatives from each curriculum area to coordinate pupils' experiences of cross curriculum threads.

To work with other coordinators to ensure a coherent approach to cross curriculum areas. (Internal school document, April 1989)

⁵ The others being Careers Guidance, Health Education, Environmental, Citizenship, Assessing and Recording Achievement, Special Needs, Learning/teaching Styles and Progression.

A coordinators group was also established as a second formal forum involved in curriculum decisions.

A permanent senior appointment of "Curriculum Development Coordinator" was also created and advertised, the job being summarized as follows:

to support and provide leadership for the curriculum group and the coordinators group in their work. S/he will ensure that, as far as possible, the different curriculum initiatives, both internally and externally instigated, are coordinated successfully.

(Internal school document, April 1989)

As well as providing details of these and other jobs, and outlining the structure of meetings that was being put into place, the booklet outlined the procedure for the first curriculum area meetings (to be held on a specified day later in April). At these, either a convenor had to be identified and put forward, or a procedure for appointing one had to be decided upon. The agenda of the meeting was spelt out down to such details as taking minutes, copying these to the head, and deciding on the date, time and place of the next meeting. The form of the booklet suggests that, not only was the new head determined to involve staff in decision-making, but he was also intent on leading them along the path of how to be involved. This is further evidence that the head was aware of the need for a re-educative approach: recognizing that the new norms of behaviour he was requiring of his staff were different from the old ones and offering help in the establishing of the new norms.

The creation of a D&T curriculum area

I have already noted that, of the departments named nationally as possibly contributing to D&T, science in Upgrove School felt that they would be fully occupied in implementing their own subject. The head's booklet noted possible conflicts of interest for some teachers such as art, between two curriculum areas. I have also noted that in Upgrove School art stayed out of D&T, opting to be in the expressive arts curriculum area. This decision by art

meant that, at this stage, the school was relatively unusual within its own l.e.a.: the great majority of schools opting for a structure that included art.⁶ It has to be remembered that art and CDT share the same teaching block and the same little staffroom. It was even possible to discern a spectrum of activity along the length of this block, from resistant material workshops at one end, through the graphics rooms in the middle, to the art rooms at the other end. So, despite apparently obvious connections of physical proximity and friendship, art was not to be included. Peter, head of CDT, subsequently indicated some disappointment at this, but respected the decision. Tom wanted to retain a strong link with art - he had previously done some art teaching, and Tony felt that there should be an input from art if possible. There was some informal conversation on the issue between the art and CDT staff, but when the decision by art to remain separate was made the head allowed the decision to stand. However, the physical proximity of art and CDT did suggest that informal links and mutual support (even at the mundane level of enabling pupils to borrow equipment when doing project work) would continue to be possible. Also, there seemed no reason to assume that any organizational change would cause people who supped breaktime tea together to change the habit of a lifetime.

Although there was no firm national guidance about whether to form D&T "departments" or "curriculum areas", the view that prevailed in the l.e.a. (evidenced by the subsequent l.e.a. document) was that the curriculum area kind of grouping was an appropriate way to establish D&T as a distinct subject on the timetable. The evidence that staff were getting from their colleagues in other schools, and from the l.e.a., was that the "curriculum area" was the way ahead. In particular at this stage, and in line with previously-described national developments, HE staff in this school were making quite sure that they were included in the arrangements, and this certainly contributed to the formalizing of the arrangement at Upgrove School. Here, HE had to find a niche within the D&T curriculum area because there was going to be nowhere else for the teaching of HE in Y7 to Y9. On

⁶ The previously-quoted l.e.a. survey of 1991 revealed just two schools where art was not included.

the other hand, in this school, BS were drawn in rather wondering what it was all about. Whereas at national level, Ben Kelsey had created a high profile for the BS interest group through his involvement first with the D&T working group and subsequently with the D&T pilot scheme, in this school BS was still inclined to see a future *as such*, with a contribution required of them to D&T because of national dictat.

The process of filling the new posts resulted in Alison applying for and being appointed to the newly-created senior position of curriculum development coordinator. Thus, the second member of the HE department took up a significant post having responsibility for coordinating school-level curriculum decisions. The D&T curriculum area took up the option that the post of D&T convenor should be subject to interview. Of the three existing heads of department (who would continue in that function within the curriculum area), Peter (CDT) applied whereas Joan (HE) and Sylvia (BS) did not. Joan did not think that she "was in the running for the job" (TR). Sylvia did not consider herself "to have the necessary expertise" (TR). Alison had just been appointed to her new job as curriculum development coordinator in the school was not in a position to apply, and the only other person to go forward was Phil. Peter and Phil were both interviewed and Peter was appointed for the spell of two years. Phil had more or less decided that he didn't want the job because it would have meant giving up his post as examinations officer which he enjoyed.

Peter therefore found himself in an interesting position. He was one of three departmental heads within the curriculum area, but also its overall convenor. As the head of CDT he was already on a higher salary allowance than Joan and Sylvia, being responsible for a larger department. He was a member of the subject group that appeared nationally (as Chapter 2 (p.63) indicated) to think that it was going to be the dominant partner in the implementation of CDT. However, his new appointment attracted no extra salary allowance, and his task was to represent the curriculum area *as a whole* within the designated formal meeting. However, he retained a responsibility to his own staff as head of the CDT department *within* the curriculum area. Several members of the curriculum

area observed on various subsequent occasions that they didn't envy Peter the task. It will emerge later in the case study that there was, at one stage, some feeling from HE that Peter was siding with the CDT staff over one particular issue. Whether or not he was, the issue of leadership within and management of the curriculum area became mixed up with that of the relative status of the three contributing subject departments: a problem which was to be for some time a significant feature of the change process. Although no-one from outside CDT had sought the post of convenor, the appointment of Peter did reinforce the view in HE that CDT somehow felt themselves to be the senior partner. The appointment of a CDT teacher as convenor or its equivalent was not unusual within the l.e.a. The subsequent l.e.a. document based on the survey of schools in the 1990-91 school year showed that the great majority were of CDT background (Figure 5.3, below). One of the inevitable consequences of this was that within the l.e.a. only four D&T coordinators were female.

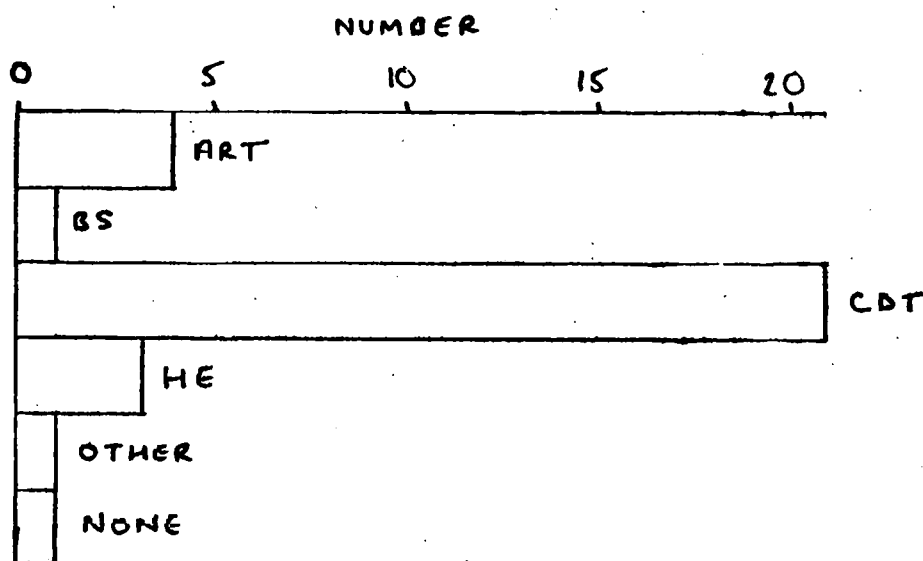


Figure 5.3 L.e.a. figures for subject origins of convenors (total numbers).

The situation in this l.e.a. was also typical of that nationally as Figure 5.4 (below) shows.

Martin and Coleman (1990) had their own concerns about their findings that, compared with the 62% for CDT:

all other subject specialisations were at or below 11%. This enormous disparity is certainly one of the most significant ... findings of this survey.

The relatively low representation (11%) of HE specialists as coordinators is particularly noteworthy ... It would appear that senior school management consider that HE specialists are an essential part of the "delivery team" but are reluctant to appoint HE specialists as coordinators. Whatever the reasons, a gender biased and subject specialist stereotyped management has been established which is likely to distort secondary education for years to come (Martin and Coleman, 1990, p.137).

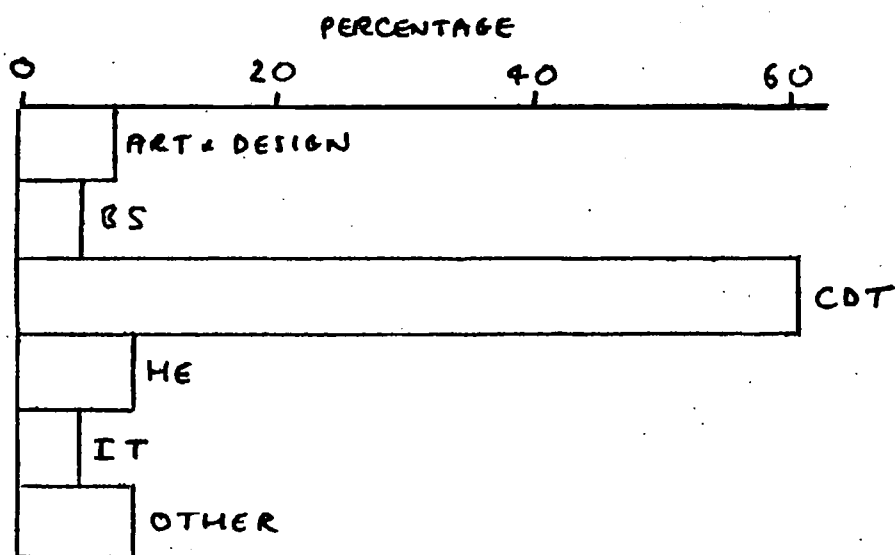


Figure 5.4 National figures for subject origins of convenors (percentage)(from Martin and Coleman).

Linked with the observation about the predominance of CDT specialists as coordinators is the mechanism by which printed material about national curriculum D&T became available in the school during this early period. Quite often, Joan would obtain an initial copy of the latest DES or NCC document *via* a contact in another school. The head would tend to direct single copies of documents received in school to the head of CDT in the first instance. Joan sometimes found it faster to obtain a copy for her own reference by the alternative route. A series of small issues such as this could not but reinforce the feeling in HE that survival had to be fought for. In all such ways, therefore, the school-level HE interest group found itself having to stake a claim in D&T much as had to happen at national level. The difference at school level was that the HE staff, as well as feeling they had to fight for their cause, also needed to work very closely with their BS and CDT colleagues in the implementation of D&T for pupils.

The role of the l.e.a. and the school management team

The head had initiated the process of setting up the curriculum areas, and the D&T curriculum area had become established as it was partly as a result of local responses to national developments and partly as a result of advice within the l.e.a. and the wishes of individual teachers. Perusal of the head's April 1989 booklet indicates that the structure for implementing the national curriculum did not directly involve any of the deputy heads (they were to be concerned with the day-to-day running of the school). In fact, the head had already decided that alternative structures were needed to "bypass the existing management team" (NR). He had rapidly developed the view that the urgency of the national curriculum cause was not being served by the existing deputy heads who had operated for many years under his predecessor's relatively static regime.⁷ One change that

⁷ The three deputy heads had had the following general responsibilities under the first head:

- a) primary liaison and arrangements for children arriving in Y7, general pastoral oversight.
- b) Maintenance of academic standards and staff ethos, probationary teachers.
- c) Staff cover, room changes, school trips, property maintenance.

he had introduced was that, whereas the first head had taken personal responsibility for making the timetable (another aspect of his control of the school), he had delegated this task to the deputy head also responsible for primary liaison.

A particular feature of the implementation of D&T nationally was that l.e.a's and their advisory staff were having to respond in parallel with schools. There was no national strategy of providing *advance* information to l.e.a's who might, therefore, be in a position to help schools. The information that emerged (reports, statutory Order, non-statutory guidance) was made available simultaneously to schools and l.e.a's. One consequence of this was that l.e.a. advisory staff were finding themselves in responsive mode in much the same way as schools. Thus, for example, most l.e.a's had advisory staff for the separate (BS, CDT, HE) subject areas, and such people had to work out a structural response to D&T just as their colleagues in schools. Another consequence was that l.e.a. advisory staff had precious little time to organize any In-set based on firm information that had relevance to the pressing needs of teachers faced with the prospect of pupils needing to be taught D&T in September 1990. One of the most persistently-expressed views of the staff of the D&T curriculum area was that they were having to "work out their own salvation", and that support or guidance from their l.e.a. advisory staff was, over the issue of D&T implementation, minimal.⁸ Peter's subsequent reflection about the l.e.a. national curriculum advisory team was that:

"My worry about them is that they know slightly less than us ... while they're still learning alongside us they're of next to no help" (TS, 3 July 1990).

Thus, in the case of this school, one level of support did not appear to be materializing in anything like an appropriate way.

⁸ This is how it was seen from the staff's point of view in this school. This may not have been the case in all schools in the l.e.a., and was certainly not the case in all l.e.a's. I shall reflect on this in the final chapter.

The initial responses at school level to the arrival of the national curriculum in general and D&T in particular were taking place over the period February-May 1989. The composition of the D&T curriculum area was decided and Alison and Peter were in their new posts by May 1989. It was not until January 1990 that the l.e.a. held a meeting for the heads of its schools on the subject of D&T⁹. In fairness, that date was selected to follow the publication of the D&T final report (DES/WO, 1989) in November 1989. However, it is apparent that significant decisions had been made in Upgrove School well before this, and on the evidence of earlier information. At the January 1990 l.e.a. meeting, several points were highlighted for heads (as reported in the 1991 l.e.a. document):

- 1 D&T is conceived as a new subject which draws from a number of existing subjects in the school curriculum. No one existing subject should be seen as a "senior partner".
- 2 A school coordinator would be required who would have the standing to draw together the various disciplines represented in D&T.
- 3 A member of the senior management team should be associated with the planning and structuring of courses in D&T.

(L.e.a. document, 1991)

I have already noted some of the tensions inherent in Peter's role as D&T convenor - the role referred to in point 2 above. In Upgrove School, one deputy head was designated as having the responsibility of association with D&T (point 3 above). This happened to be the same deputy head who had just taken on responsibility for making the timetable on top of other responsibilities from the previous regime. A factor in the implementation of D&T here is that the presence and influence of that individual in the curriculum area did not materialize. In this respect, therefore, as well as in respect of help from the l.e.a., the staff were left to their own devices.

⁹ The source for information about this meeting is the l.e.a. document of 1991.

5.3 Initial events in the D&T curriculum area

The early stages of the working of the D&T curriculum area provide further evidence of the impact on the change process of the previously-outlined historical context of the school. Members of three departments who had previously had little to do with each other found that they had to work together to implement a new subject whose definition was far from clear. Thus the issue of interpretation and implementation of the subject specified in the Order was compounded in this school by the lack of a history of cooperative working *between* departments. The culture *within* the CDT department also tended to be independent, rather than cooperative. In this situation, the necessary negotiation - formal or informal (Weston, 1979) - enabling construction of meaning (Fullan, 1991) over the implementation of the curriculum was likely to prove difficult. The head had set up and carefully explained the new structure that would enable the necessary negotiation, but the majority of staff had no experience of how to work with such a structure. In terms of Ball's micro-politics, the changes introduced had altered the rules of the micropolitical game in this school. The head was beginning to expose to public debate issues that had previously been resolved in essentially private discussions. Also, the head felt that his predecessor's way of running the school had actually reinforced the tendency of departments to become power bases. His view was that if decisions about the distribution of money - either capitation or allowances - had been made on the basis of one-to-one encounters between the head and members of staff, and with no relatively public forum for scrutiny of and debate about such decisions, then it was likely that staff would identify even more strongly with their subject department.

In these early stages, a variety of encounters took place between a range of people, some of which began the long process of creating an identity for the new curriculum area that others within the school would perceive, and some of which were to do with the internal forming (using the term from Adair (1987)) of the group of teachers comprising the curriculum area.

The D&T curriculum area became on its formation a transitional, hybrid department

created from the three smaller subject departments. However, as has already been noted, the existing CDT department was still in transition from its previous craft-based form in which specialists had worked more or less independently. The head's view in 1989 was that it would take about ten years for it to become like the science department i.e. he saw the science department, which was already making its transition from separate science subject departments, as a model for D&T. It should be noted that the science department in Upprove School by this time occupied a fairly compact territory (with a science staffroom), especially by comparison with the three discrete areas of the new D&T curriculum area. Also science had previously had to face the issues associated with teaching combined, rather than separate, science, so did not have to face that issue as such when the national curriculum came along. The evidence that will be presented in this thesis suggests that transition did occur in that direction during the three years of the study, but that the hybrid nature of the D&T curriculum area resulted in some circumstances in interest groups operating along the lines of the former subject departments (sometimes making Peter's dual role quite uneasy). However, there were also differences of opinion *within* the CDT and HE groupings (not so significant in BS) about the implementation of D&T, so that different alliances were formed at different times. Put simply, coalitions were not always delineated along subject lines: rather it all depended on the actual issue and how individuals felt about it.

At several stages in the creation of D&T between the interim report of December 1988 and the statutory Order of March 1990 there were opportunities for subject groups, i.e.a's, school departments and individual teachers to make a response to the working group or the National Curriculum Council. The circulation of documents to schools meant that the formative thinking behind the eventual statutory Order *was* available to any who wished to and could find the time to read it. In this school there was variation in the degree of familiarity with the nature of the formative documents - all of which had been in the school. Peter, Joan and Alison had kept themselves very closely informed not only because they realized the need to do so because of their positions in the school, but also because they were keenly interested as individuals in how the subject was emerging. Phil had

"learned up" (TR) the available information when he applied for the convenor's post, but hadn't kept particularly in touch after that.

Those who had taken the time to read the emerging documents (Peter, Joan and Alison) expressed guarded optimism about the statutory Order. Peter had reservations but in general found reassurance, feeling that D&T was evolving in a way that did not take it too far away from the existing nature of CDT: "The basic processes I've taught within design are within that document [the Order] - I wouldn't expect to change" (TS). His reservations were mainly about the lack of specified content, finding the Order "vague" in this respect. He felt that this was deliberate policy to enable schools (such as girls' schools) lacking certain facilities to teach the *process*. However, he also felt that the Order had "been left open enough for us to be able to put a little bit of our own interpretation on it" (TS). It is significant that, even with decisions about the nature of D&T GCSE courses still a long way in the future, Peter felt at this stage that decisions about D&T at KS3 were tentative because "we've got to wait and see what the year 10 and 11 courses will be like - that will be dealt with by the exam boards" (TR). This demonstrates his conviction that - despite the statutory nature of the technology Order - the normative nature of the new subject would only really be able to take shape when the definitive requirements of examination boards became known. He took a fairly conventional CDT view of technology as being primarily about knowledge of structures, mechanisms, etc. being applied within the design process. So he acknowledged that textiles and (rather less) food *could* provide the basis for design work, although he had been content with the narrower view. The HE staff were reasonably happy with the "openness" of the Order, feeling that it was not exclusive to CDT. However, they were more keenly interested in teasing out exactly what contribution HE would be making, and had to work quite hard at constructing a meaning for the process and content (such as it was) being defined for D&T, and in relating this to their existing teaching. Thus, for example, pupil material used in HE in the 1989-90 school year had already been "tweaked" on the basis of the early reports to demonstrate the linkage with

D&T. An example is a worksheet outlining a project headed "Design and Technology: Textiles" and structured around the four proposed attainment targets.¹⁰ There seems little doubt that the language used to describe D&T in the emerging documents was more familiar to CDT teachers than to HE teachers. Therefore there was more of a task of constructing meaning for HE teachers. The BS teachers in this school simply said that D&T was something quite different to their normal experience - and if they were to contribute they would need to be told what contribution was expected of them.

Whereas a *departmental* response (as representing the subject interest group in this school) can be characterized relatively easily for BS and HE, such a characterization is less easy in the case of CDT because of its hybrid nature. Therefore it is necessary to consider in closer detail the response of the individual CDT teachers firstly because of this variation and secondly because of its subsequent impact on the implementation of D&T.

Responses in CDT

Whereas Peter had kept himself closely in touch with national developments, Len the woodworker had opted out of any discussion. Phil the draughtsman had serious concerns about the nature of the new subject, particularly as it appeared to affect his own specialized area of Design and Communication. Tom the generalist had not been closely involved in looking at the emerging paperwork, but was generally in favour of an approach that he felt broadened the base for what he could legitimately include in his own teaching. Tony the newcomer, in his first year of teaching and straight out of a B.Ed course, had been grappling with the emerging nature of D&T as part of his initial training. He, too, was in favour of the broader subject base that appeared to be possible in D&T. So there was a complete spectrum of views within this department - views that came largely from the way that the members of staff constructed their own meaning for what they were doing as teachers of their particular specialisms, having had particular life and career histories, and

¹⁰ Source: pupil worksheet given to me in December 1989.

being associated with earlier subject communities. As was suggested in Chapter 3, in the case of teachers their unique response to a change requirement has a great deal to do with their need and ability to sustain the everyday aspects of their job within a meaning structure. This ability and the meaning structure in which it is located in turn depend on the mix of present circumstances, the nature of their formative training and induction into the profession, and their subsequent training and development as individuals capable of maintaining in a classroom Waller's "quivering equilibrium". The following accounts of teachers' initial responses to the national curriculum show how the response relates to the teachers' own meaning structures. The accounts include some further elements of personal description, again designed to assist the reader with building a picture of individual staff. The information represents the views of the various staff during the 1989-90 school year, confirmed at the end of the year, by which time copies of the statutory Order had been in the school for several months¹¹.

*Len: the woodworker's tale*¹²

I shall never forget my first encounter with Len, the woodworker. It was on my second visit to the school, when I was waiting in the workshop for an appointed meeting with Peter. Len, who had never met me, saw me, wandered over and asked who I was and what I wanted. I told him, and said that my interest was in the implementing of the national curriculum. That provoked a fairly vigorous comment about the national curriculum in particular and educationalists in general, ending with a good-natured but definite suggestion as to where a reasonable storage place for the national curriculum may be. After about five minutes (Peter having been delayed by needing to attend to some pupils), Len came back to make sure that I had got the drift of his views. So why this reaction?

11 In each case, taped interviews were used to confirm information that had been gleaned from conversations. Most staff in the curriculum area were interviewed initially on tape at the end of the summer term of 1990: partly to obtain factual information and partly to corroborate opinions expressed in other situations. A full schedule of taped interviews is presented as Table A.2 in the methodological appendix.

12 Taped interviews 3-7-90 and 20-7-92.

Was it simply that of a man (easily stereotyped as reactionary and backward-looking) unwilling to acknowledge the need to change? As noted earlier, he was a time-served carpenter who had done national service and was working for a local firm when he was attracted to the possibility of becoming a teacher by the advertising of the government in power in the mid 1950s who wanted such craftsmen to become teachers in the shortage craft subjects. As he put it "I thought I could better myself ... I got fed up getting over other people's mistakes" (TR 3-7-90). In accordance with the requirements of the time, with negligible professional training in education, but with a wealth of experience as a craftsman in wood, he became a woodwork teacher. After some years in one school, he was effectively sought out by the first head on the basis that Len sounded to be exactly the kind of teacher that the first head wanted in his craft department. So Len moved in and stayed. They were good days initially, even in the mid 1970s. The "lads" who came to the woodwork room were pleasant enough, and Len was able to work with them in the style of a master-apprentice: learning about wood, making things to take home. "I got the kids working and not chatting to them too much ... any theory they wanted to know came up ... if we found a bit of wood with a hole in it we would stop the lesson and say well, this is furniture beetle ... I wonder if we're [now] trying to push too much theory down them" (TS 3-7-90). But then changes were starting to happen, or were required, many of which were opposed to Len's view of the world. For one thing, girls had to start doing technical subjects. That seemed, to Len, to be an unnecessary forcing of an issue: "I do think it makes a hell of a lot of difference when you get a lot of girls in that just don't want to do it" (TS 3-7-90). The requirement also had the direct effect of halving the time that the boys had to do anything useful (because the boys also had to start doing HE): "You need plenty of time to develop skills" (TS 3-7-90). And then there was the need to get the pupils to design, as well as make. This was, according to Len, a detrimental step for many of the pupils who had previously found much pleasure out of straightforward woodwork: the introduction of CDT "went and cocked it up!" (TS 3-7-90). According to Len, the pupils still wanted to get on and make instead of "messaging about" (Len would be pleased with the previously noted *Daily Telegraph* observations on the subject of *Woodwork Dunces*

(p.34)).

Len's views and his willingness to state them represented something of a challenge to Peter's task of overseeing the implementation by *members of his own CDT department* of D&T in the school. But Len cared deeply about the quality of work produced by his pupils and his own ability to be an effective teacher in his own terms. He also perceived a need in the world for the kind of craftsmanship of which he himself was capable and which he believed could inspire the best efforts in some pupils if they were given a chance. He was very much out of the craft tradition that had viewed the arrival of design with some doubt as to its effectiveness as an approach to teaching. So Len, for a range of reasons, was not for the national curriculum and, at this stage near the end of his career, he wasn't overly worried about letting his opinions be known.

*Phil: the draughtsman's tale*¹³

Of all the rooms in the CDT suite, it was Phil's that exuded a particular style. Design and Communication was the medium and the message, and it was *Phil's room*. As noted previously, all the CDT staff identified with particular rooms, and all the rooms communicated something about their incumbents. But Phil guarded access to his room, making expressions of discomfort when anyone else was timetabled in to it, even for a single period.

Phil's personal expertise and skills extend well beyond the particular medium that he has made his specialism in the school. For example, he pursued electronics as a hobby in his youth, at the beginning of the transistor era making for himself a forerunner of the "Walkman". However, he was appointed in the first instance to teach technical drawing, and had developed that into CDT: Design and Communication. I have previously noted that he introduced A-level design into the curriculum (before Peter's arrival) because "we

¹³ Taped interview 4-7-90 and a subsequent retrospectively noted conversation.

needed A-level work in this department" and it was "better [than technical drawing] for university entrance" (TR 4-7-90). He "saw the writing on the wall for A-level technical drawing" (TS 4-7-90). In order to teach it he "picked up the necessary skills" (TS 4-7-90) as he went along. Once he had got used to the nature of the A-level design course he found it relatively easy to make the transition to GCSE Design and Communication, when that replaced earlier technical drawing syllabuses. It is of note that he took a very broad view of the nature of design: "designing is a very basic thing isn't it - you find a problem and solve it - everything you do is basically a design problem - planning a holiday" (TS). He had become a great enthusiast for design and communication. He wasn't in favour of D&T:

I looked at the national curriculum documents as they came out ... I could see what was going on ... at one stage when convenors were being appointed I had to learn up. It turned out to be not what I wanted ... I'm happy to leave Peter to that. Graphic design is important ... it could go out ... the exam could be a bit of this and a bit of that ... At the moment I'm in charge of my own area ... I like being my own boss ... I'm going to become just a cog (TS 4-7-90).

His main concerns, therefore, centred on the loss of identity and integrity of his part of CDT, which he saw as a subject in its own right. He could trace the development from technical drawing to design and communication that linked with the professional areas of draughting and graphic design in the world. The A-level design course was similarly linked with graphic design and the three-dimensional modelling associated with design. He felt that he could still point to jobs that people could do if they followed courses in his subject area. Therefore, he saw himself as teaching a subject that had direct relevance for pupils seeking jobs. He had a pedagogy that recognized that pupils needed to develop skills of visualisation as well as skills of presentation. He had a complete rationale for his own subject (even though organizationally it had become part of CDT) and knew what he was doing, why, and how he was doing it. His perception was that the D&T proposals reduced that "subject" to a small part of D&T. Whereas there had been the possibility of specialisation in design and communication *within* CDT, it now seemed to Phil that, whilst all pupils would be having to do D&T, they would be having to do *less* of each aspect of

D&T. Consequently he wouldn't be getting the satisfaction of seeing pupils right through the school, even to the end of an A-level. Also, the further reduction in the time spent on his specialism (because of bringing in BS as well as HE), with pupils moving round far more, would reduce the control he had over pupils and their work. For Phil, as for Len, the quality of pupils' work was directly related to the time they could spend practising the necessary skills and his ability to keep track of them. A full mark book was one of Phil's signs that all was going well. Phil was in control of his day-to-day teaching commitments but profoundly disturbed by the implications of the impending change.

*Tom: the generalist's tale*¹⁴

I heard Tom before I ever met him. Of all the CDT teachers, Tom was the one who exhibited the greatest vocal range during class contact. It was a definite style, perhaps linked with his need to shout loudly at children whilst coaching swimming. I was waiting with his class once, outside his workshop. We were all fairly quiet, but we heard Tom before he came round the corner, at which point the level of noise in the class increased significantly, resulting in a reinforcement of Tom's need to shout above it.

Penfold (1988) presents a stereotype for the design-trained teacher of Tom's generation, compared with the previous craft teacher stereotype. I cannot imagine that Tom would ever have adopted the former stereotype, but the new one suits him to perfection:

short back and sides gave way and grew into flowing locks and sideburns and out went the time-honoured national dress of the fraternity. Well worn, elbow-patched sports coats, with top pockets of gleaming pens were discarded in favour of leather and suede jackets and coloured shirts (Penfold, 1988, p.123).

Tom was very much for the national curriculum if it meant he could have greater freedom

¹⁴ Taped interviews 5-7-90 and 4-7-91.

to combine the artistic with the technological, and if it meant the opportunity to work in a range of materials: "It's something I've always wanted - I hate the single area" (TS 5-7-90). He was trained in art and craft, and his own craft skills were more broadly based than, for example, Len's. But Tom didn't claim to be a "craftsman like Len" (said quite genuinely) although reckoned he was "far more adaptable than Len" (said more tongue-in-cheek)(TS 5-7-90). Tom's initial encounters with the documentation of the national curriculum were as infrequent as could be decently admitted: "I've scanned them ... it's going the way I want to go" (TR 5-7-90). Unlike Len, he approved of the earlier change to GCSE because it consolidated the design-process based approach that he likes to use. On a wall of his room was a sheet that outlined the stages of the design process, and the large roller-board in the room usually had this same process spelt out as it related to the task of the particular group of pupils. Whilst he was willing to mark coursework such as that for GCSE, he was clearly not one to take kindly to extra paperwork associated with profiling or reporting: "It's difficult to know if it's helpful ... it impinges on time" (TS 5-7-90). But, regarding national curriculum D&T, Tom was definitely for it, although his knowledge of what "it" was at that stage was relatively undetailed.

Tony: the newcomer's tale¹⁵

Tony was, like all the others, in part a product of his training. But whereas the other CDT staff had been trained as teachers up to twenty years ago (and, in Len's case, hardly at all) and had a considerable length of teaching experience to socialize them into the profession, Tony had little experience of teaching (but a great deal of life experience and immediate "street cred" with the pupils). So Tony had not experienced formative years as a woodwork or metalwork teacher or even as a CDT teacher. The significant influence was that his B.Ed course was obviously just making the change from a CDT focus to a D&T focus, because teacher training institutions were finding out about D&T in parallel with

¹⁵ Taped interviews 3-7-90 and 4-7-91.

everyone else. But his thinking during his training, and his own view of the nature of D&T, combined to make him believe that the pupils should be able to work in a variety of media. He, like Tom, felt that the subject was entirely appropriate for boys and girls.

Consequences of being a hybrid department

At this stage, therefore, the CDT department was divided into those who looked on D&T as more or less matching their own perception of what they were trying to do within their existing teaching (Peter, Tom and Tony), and those for whom it presented considerable problems (Phil and Len). Apart from presenting Peter with particular problems about who could or should teach D&T, this situation created a more general influence on the planning for the implementation of D&T. Phil and Len did not find it easy to engage constructively with the discussions that were needed within CDT and in the wider curriculum area. Fortunately, the incremental introduction of D&T meant that the issue of who would teach D&T could be solved relatively easily in the short term. The indications at this stage were that Tom and Tony would be likely to be selected as those members of the CDT department contributing to teaching the first cohort of pupils in September 1990. The broader issue of suspicious attitudes to the whole concept of D&T was not one that could be solved over a single breaktime cup of tea. The extent to which normative meaning structures had to be addressed and changed in the case of Len and Phil was simply not allowed for in the implementation strategy envisaged by the NCC.

Responses in HE

The individual members of the HE department each had to make their own response to the arrival of D&T, as did the members of the other contributing departments. Jenny (the newly-qualified teacher on a one-year appointment) and Mary (part time) were involved to some extent in the discussions about D&T, and played a significant part in a pilot activity with pupils that is recorded later in this chapter. However, they both left the school at the end of the summer term 1990 so had rather less to do with planning for D&T than if they had been staying. Joan and Alison had worked together for some years, especially on the

implementation of GCSE syllabuses. They had developed a common view about the place of HE in D&T, and presented a united front in the way that members of the CDT department did not. Therefore I deal here more with HE as a department than with individuals. The two issues to be dealt with follow on from each other. The first concerns the struggle within the HE department that paralleled that at national level about the identity and value of HE in the curriculum. The second concerns the struggle in this HE department to construct meaning for the technology Order from the existing HE meaning structure.

The struggle for subject identity

The HE department in the school had a history as long as CDT: the first HE teacher being appointed along with the first woodwork teacher in the first batch of nine staff on the foundation of the school. I noted in Chapter 4 that in many ways there had been a direct equivalence between the two departments, although I also noted Joan's feelings about lack of status. One difference between the departments was the fairly strong presence of the A-level course within the CDT department, whereas the HE A-level had not found sufficient pupils support to remain viable. Both departments had seen changes in their examination syllabuses, consolidated with the arrival of GCSE. Members of the HE and CDT departments reflected at times that, on the one hand, the examination syllabuses now gave a more academic flavour to their subject but, on the other hand, made the subject less accessible to some pupils. There was an acknowledgement that, historically, both subject areas attracted some less academically inclined pupils.

The HE teachers could see that work in textiles and, less easily, in food, could be approached in a way appropriate to the requirements of D&T (more of which in the next section). But the vulnerable area seemed likely to be the GCSE Child Development course. Joan, who had introduced that course to the school, felt that its content remained valuable for many of the pupils who took it, and would be a loss to the curriculum. Even so, she reflected critically on the introduction of the GCSE syllabus that had replaced a CSE in

Childcare with GCSE HE: Child Development.

It isn't such a good exam for the type of children that we get ... because it's requiring a much more academic aspect of child development than the children that opt to do it want to do or are capable of doing ... it isn't child *care* any more ... you don't do anything about how do you bath a baby, how do you make up a feed ... there's an awful lot of 'how does a child develop emotionally and so on' ... what the children want to know is - practically - how do you look after it? (TS 6-7-90).

There is an ambivalence in wanting status for a subject but, at the same time, wanting courses that fill the requirements of children who are not academically inclined. The changes in the Childcare syllabus, and Joan's response to them, provide a parallel between HE and CDT. Just as teachers such as Len believed that the move to CDT with a greater intellectual content had been a disadvantage for some pupils with more practical interests, so Joan felt the same about Child Development. However, Len never seemed worried about the perceived status of his subject in quite the same way. There is no doubt that D&T follows the 'design' or 'investigative' approach that requires more of pupils than skills development. Moving the subject in this direction supports Goodson's view that subjects tend from the utilitarian to the academic.

More specifically to HE, there was a feeling that much of what HE represented as a subject *in its own right* was about to be lost in the process of integration or assimilation into D&T. Joan in particular expressed exasperation:

The government tend to contradict themselves sometimes ... they talk about home economics as only being a little bit of technology now ... it's not really important as a subject in its own right ... and then Margaret Thatcher starts talking about how important the family is. You can't have it both ways. If you put it into technology it ceases to have the family input so much ... why aren't we leaving in a subject that concerns itself mainly with the family ... which is home economics? (TS 6-7-90).

It was a point over which Jenny appeared to be in complete agreement with Joan (even if

she ascribed views to a different politician¹⁶):

Kenneth Baker said 'the youth of today are not prepared to become good parents and homemakers' so he was trying to rush through all these sweeping changes in education ... I reckon it will spiral back. (TS 5-7-90).

Alison's concerns were about the parts of HE that would be excluded from D&T:

Home economics is a lot more than the technology part and that's the bit now that concerns me ... how and where we're going to deliver that part (TS 6-7-90).

Whilst Joan and the other HE staff could begin to see *how* they could teach within the D&T framework, they didn't really think that they should be having to. I noted in Chapter 2 that there had been a debate about the whole issue of the place of HE in the curriculum. But, despite the loss of HE from the national curriculum, the teachers in this department in Upgrove School felt that on the basis of pupil satisfaction and examination results they were offering valuable learning experiences to the pupils doing their subject. It is not part of my thesis to debate the issue as to whether or not they were actually "wasting girls' time" (as Attar (1989) puts it). *They* didn't think they were, and that belief coloured their response to the implications of D&T. The HE staff had a rationale for a subject that connected with activities in the outside world, and they had evolved a pedagogy to suit the approach to the subject favoured by examination boards. Up to the 1989-90 school year the department was teaching option sets in Y10 and Y11 of a good size and the pupils were obtaining respectable GCSE grades.

¹⁶ At this time Margaret Thatcher was Prime Minister. Kenneth Baker had recently been replaced as Secretary of State for Education.

The struggle to construct meaning from the Order

Chapter 2 showed that the statutory Order for D&T that was published in March 1990 was built round the concept of four attainment targets that identified aspects of *process*. Programmes of Study (PoS) and Statements of Attainment (SoA) focused on aspects of this process with content mainly given in the form of examples. It is worth reviewing that the four Attainment Targets (ATs) were

AT1: Identifying needs and opportunities;

AT2: Generating a design;

AT3: Planning and making;

AT4: Evaluating.

Whereas CDT teachers had become fairly well acquainted with what they described as "the design process" which used similar process-based language to that in the AT descriptions (generating, planning, evaluating, etc.), the language of HE, whilst including processes, was not quite the same, as comparison with the wording from the examination syllabus on p.113 reveals. Joan and Alison would talk with more familiarity about "the investigative approach" which had replaced the earlier "skills-based" approach. They were convinced that their investigative approach corresponded with the design process of CDT and, therefore, with the approach needed in D&T. Joan commented that

we have been doing technological activities for quite a long time. The GCSE began a lot more investigation work ... because of GCSE we changed the lower school too ... we began using design brief and investigation methods long before the national curriculum told us we were supposed to (TS 6-7-90).

In making this comment, she used the phrase "design brief" which is typical language used in CDT, alongside the typically HE "investigation methods". Much of the time that they could find in the summer term of 1990 was spent in looking at what they wanted to teach

to the coming Y7 pupils and then poring over the Order to see how this fitted and how much tweaking of existing activities would be necessary. Joan and Alison usually did this work together because "two heads are better than one" (R). They both kept an eye out for whatever planning documents came available (the *TES* and professional magazines carried advertisements for such material) and sought them out either directly or by borrowing from other establishments. Some were found to be more useful than others: often what was sought was confirmation of the way they felt they would like to be teaching. Whilst this approach appeared to require more work on the part of HE than on the part of CDT, because of the greater difficulty of constructing meaning from the HE experience, the process of deciding what skills and knowledge was desirable and then seeing if this could be built into activities that matched the Order is typical of the approach taken in CDT and HE. In particular, the CDT and the HE teachers retained very firm views about what they wanted to teach, to retain in Y7 the basis of skills and knowledge that they felt essential to the internal integrity of their part of the subject. Thus, for example, skills of cutting, shaping and joining of resistant materials and textiles were felt in their respective departments to be essential basic requirements. Existing activities were painstakingly mapped against the Order and then adapted to ensure maximum coverage. Inevitably, of course, there was to be a considerable loss of previous content, not least because of the need to bring in the BS aspects which had not previously been taught in Y7 and Y8. So there was heart-searching all round about what was really important to retain, and what appeared to be emerging were three discrete lines of skills development (from BS, CDT and HE) structured round a common process. This rather pragmatic solution was exactly as feared by some commentators on the nature of D&T, but was all that appeared possible in practice in the absence of any overall vision of the nature of technology, and in the light of the need to get something together for the pupils arriving in September. At this stage, the only possible approach that left the teachers with confidence that they could teach from their existing subject experience seemed to be to take parts of these existing subjects as possible inclusions within overall themes. I shall return later to this use of themes (e.g. "energy") as a way of organizing the teaching of D&T. In terms of constructing meaning for D&T, the use of themes can actually be a way of *avoiding* the necessary reconstruction

of meaning by allowing relatively trivial connections to be made between diverse activities.

Several school-level decisions

I suggested in Chapter 3 that the particular circumstances in a school make the process of change unique to that school. I introduced a curriculum planning model (Figure 3.2 p.99) that shows that various influences on the planning process affect the solutions. This section offers three examples of this: the solutions themselves subsequently having an effect on the staff involved, as well as on the curriculum offered. The first example relates to timetabling, the second to option choices in Y10-Y11, and the third to accommodation.

The timetable

One of the *head's* decisions about national curriculum implementation was to set up a half-year block timetable. Therefore each curriculum area would get just over one hundred pupils at a time, with the choice of what to do with these pupils being left to the curriculum area concerned. This was a decision designed on the one hand to facilitate aspects of timetabling but on the other hand to confirm that the responsibility for making decisions about the nature of teaching groups and the use of staff was at the level of the curriculum areas. The D&T staff had agreed the need to have pupils in their area for as extended a period as possible - half a day once per week being preferable to a quarter of a day twice per week - for the effective teaching of D&T in Y7 beginning with the 1990-91 school year. The staff saw this as being fundamental to their desired approach to the teaching of D&T. It would enable pupils to get involved in spells of design or practical work without the continual need to clear up at the end of a relatively short time. Here was one issue over which the curriculum area was united against the agendas of other departments who perceived implications for their own teaching if D&T obtained half-day blocks. The deputy head charged with setting up the timetable had to respond to the whole range of agendas, so there was a tussle over timetabling between Peter (on behalf of the D&T curriculum area) and this deputy head. Here, the outcome of a school-level decision

was an internal influence (as defined in Figure 3.2) on the curriculum area's planning for D&T implementation.

Decisions affecting HE: option choices and accommodation

During the spring of 1990 the implications of two significant decisions that had already been made at school level were becoming clear. One had an immediate detrimental effect on the morale of the HE department (to add to the general feeling of *angst* amongst the HE teachers) but the other promised to assist towards securing the future for HE after some temporary inconvenience. They form an important part of the background in HE against which negotiation over the implementation of D&T was taking place.

The first decision was one that had been foreshadowed in the February staff meeting: to restrict pupils in Y10 from September 1990 onwards to a *single option choice* out of the whole range of subjects offered by BS, CDT and HE (i.e. out of what had up until then been nine subjects). Up to this point, in line with the first head's approach, it had been quite possible and quite popular for pupils thus inclined to take two (or occasionally three) subjects from the selection offered between these three departments. However, in line with the trend towards establishing a "national curriculum" timetable framework *throughout Y7 to Y11* (some staff felt prematurely), this restriction on choice was approved by the school's curriculum group. A "straw poll" was conducted of the Y9 pupils to give a rough idea of the numbers likely to opt for BS, CDT and HE under this system. The outcome of this poll was that pupils opted for BS, CDT and HE in descending numbers in that order. BS, therefore, already feeling relatively secure in the curriculum, got an enormous boost because increased numbers of pupils wanted to take GCSE in that area. CDT managed to retain a reasonable market share, but HE slumped dramatically. The reason appeared to be that many pupils had selected a subject that contained "computing" (BS), rather than HE.¹⁷

¹⁷ This conclusion is based on a brief survey I carried out of pupils in two teaching groups to find out if there was any clear reason for their decisions.

Within the curriculum area, this led Peter to believe that HE would need to reduce the number of courses that they offered from three, and that there would probably have to be some direction of pupils to courses. This was not well received by the HE staff. Also, it led to Sylvia observing that it had never been the school's policy to direct pupils to courses to benefit staff: quite the opposite. Altogether, this one event provoked a considerable reaction against Peter from the two other departments. At a stroke, however, the fortunes of HE in this school changed, with a consequent impact on the morale of the teachers in that department. No-one had (or could have?) predicted the outcome of this decision about pupil options. But its consequences affected the circumstances of the HE teachers throughout the period of the fieldwork: numbers of pupils opting for HE in Y10-Y11 did not recover in the following two years and the imbalance favouring BS remained. The feelings of Joan about the loss of pupil numbers were firstly, that years of hard work in building up the department had been swept away, and secondly, that her colleagues round the county would hear about the reduction in numbers but not the reason why. In terms of Joan's feelings about her own career, these things affected her quite deeply.

The other significant decision was made by the head, who decided that if funds could be obtained from the L.E.A. a relocation of the HE rooms would be one part of a jigsaw that would rationalize various aspects of the school's teaching accommodation. It so happened that an area of building adjacent and attached to the resistant materials end of CDT, that had not previously been a teaching space, was to become available. It appeared that it would be large enough to provide two HE rooms, so a scheme was set in motion to have this ready for use by September 1990.¹⁸ This would make a clear statement, in the Head's view, about the value of HE within D&T and about its continuing existence. It would also move two out of the three departments contributing to D&T into close proximity, thus addressing the problem of physical separation. This relocation was welcomed by the HE teachers, although it generated a considerable amount of extra work for them in its own

¹⁸ L.E.A. funding was made available. The school's buildings had got to an age where it was in line for some injection of money for upgrading of resources.

right.

Much of the second half of the 1989-90 school year was, therefore, occupied by a range of concerns in HE, all on top of day-to-day teaching, pastoral care and administration within the school. As well as trying to make sense of the Order, and trying to find ways of working with BS and CDT colleagues, and trying to sort out how to retain the integrity and continuity of their specialized input within D&T, there was a need to be involved in the planning of the new accommodation. Finally, Joan and Alison had decided that, although the numbers opting for HE had meant only two sets were viable in Y10, they would each accept pupils for all three HE GCSE subjects in each set.¹⁹ Wanting to retain the integrity of HE by offering all its aspects, they refused, at this stage, to reduce the three options offered within HE for Y10 and Y11. Inevitably, this decision, in the face of Peter's feelings about rationalization, compounded in him a growing feeling that the convenor role was unsatisfactory.

The Head's change strategy: working within the new regime

For all the departments in the curriculum area the summer term of 1990 was the time when decisions had to be made about the detail of the teaching of D&T to the first cohort of pupils in Y7 starting in the school in September 1990. While these decisions were being made, the three departments were still geographically separate. A series of curriculum area meetings had been programmed within the head's new regime, but there was a backlash from some staff about the number of meetings resulting from the head's approach to managing change in the school. Both the physical separation and the unfamiliarity with the need to work with other departments contributed to practical difficulties of members of the different departments spending time together - other than in the setting of a "formal" meeting which was unfamiliar.

¹⁹ Jenny and Mary were both moving to new jobs, which meant that Joan and Alison were making decisions on the assumption that there would be one replacement HE teacher in 1990-91.

Curriculum area meetings were just one of a whole range that the head had initiated. Many schools have such a range of meetings, but in Upgrove this was a new departure. If I heard any complaint more than another in my first year in the school it was about meetings. "Not another b***** meeting!" was heard more than once within the boundaries of the CDT department. The head's stated view was that it was right to set up the structure and to have a schedule for *potential* meetings. However, if any meeting *genuinely* proved unnecessary, the meeting should be cancelled. The D&T curriculum area meetings (quite a few of which I attended in this critical stage) contained those who just didn't want to be there and made it quite clear (such as Len, who on occasions brought a magazine to read and became agitated about leaving as soon as time was up); some who suffered by not always having the necessary paperwork (such as Tom and Eleanor whose base in the main staffroom seemed to sink agendas without trace); and some (such as Peter and Joan and Alison) who wanted to use this forum and had a good idea of how to proceed. The evidence is that, in these early days, departmental and personal agendas were never far below the surface and were sometimes allowed to impinge unhelpfully on the business of the meetings, and that there was an unwillingness on the part of some members to acknowledge the role of the forum (part of the storming process identified by Adair (1987) in which authority is challenged). For example, Tom believed that

once the basic framework [for an activity] has been established it's up to each teacher to decide what's best for the pupils ... to go farther in a meeting is a bit of an insult to the intelligence (TS).

However, the behaviour that this attitude tended to result in simply brought frustration to those who wanted to use the forum. Joan observed that

people complain that they don't know what's happening and that decisions are made behind their backs, but if they won't come to meetings and won't attempt to find out what happens what do they expect? (S).

Some progress was made, but it eventually became clear as the 1990-91 timetable took shape that some who were *not* assigned to teaching Y7 in 1990-91 would prefer not to be

involved in planning. A pragmatic solution emerged, in that those who were concerned did meet to focus on substantive issues - this being in line with the head's views about meetings. Much detailed planning went on in departmental groups where departmental agendas and meaning structures were less likely to be challenged.

The head's strategy worked up to a point: people attended meetings and some decisions were made in the formal forum of the D&T area meeting. People's willingness to negotiate formally within the constraints of the curriculum area meeting did not relate to their opinion about the national curriculum, but did relate more to their general approach to their job. This either recognized meetings as being necessary and useful or as being undesirable. The longer-established CDT staff, who had been used to independent working with informal negotiation, found the new system more irksome than most. Peter was prepared to use the forum, and Joan and Alison became increasingly disenchanted with a perceived lack of commitment to it on the part of the majority of CDT staff.

Getting together?

One initiative was agreed - that a "trial run" of a module coordinated between BS, CDT and HE should be conducted in the second half of the 1990 summer term with selected groups of pupils in the existing Y7. This would be an attempt at planning and teaching a short module that integrated teaching from the three areas. The decision to do this was agreed in principle in a curriculum area meeting. Tom and Tony warmed to this, seeing it as a positive decision to do something of practical value in the middle of a lot of politicking and (in Tom's view in particular) unnecessary talking in meetings, and also because they seemed to be in line for teaching Y7 D&T in September 1990. After the curriculum area meeting, Tom and Tony set about enlisting the help of those in the other two departments whom they felt likely to be kindred spirits - Eleanor in BS and Jenny and Mary in HE. In making this selection of staff they quite deliberately went to those *they* considered to be like-minded and inclined to work together and started planning for this activity. Eleanor was a candidate because she was in Tom's social circle in the staffroom,

and she was wanting to find out what D&T would involve. Jenny and Mary were felt to be more open to the approach than Joan and Alison. There were two unfortunate consequences of this enthusiastic action. Firstly the choice of those to be involved excluded the more senior staff of BS and HE. Secondly, the sub-group didn't tell anyone else in the curriculum area that they were doing this planning, and this resulted in some grief all round when it was felt by some that there was an attempt to subvert the formal planning process. Apart from the general feeling of subversion, the root of the problem seemed to be that Tom had suggested an existing activity he had previously used in CDT as a basis for the pilot. Eleanor, Jenny and Mary had raised no objection to this, feeling it was a good suggestion, but it appeared to have been interpreted by the senior HE staff as imposing a CDT bias on the pilot. This was, therefore, just one little incident that added to the general feeling in HE of a CDT takeover. Eventually the situation was resolved and the activity took place as follows and provided some useful experience.

The task given to pupils was to make an artefact either in textiles or wood/plastic that would be suitable for a young child: ideas were to be drawn from nursery rhymes. It was agreed that pupils would design and make an artefact in just one material, and would then think how it could be adapted for making in the material they hadn't used. The input from BS was to be a spreadsheet for costing the materials: it was therefore an input of an IT skill rather than of any understanding of business principles. The majority of Jenny's pupils made small cushions with an applied decoration picking up the nursery-rhyme theme. She found that the time allocated to design work reduced the time available for the making, which made her feel that the products would not be as good as she would wish and that the pupils would not get the practice at using sewing machines that she would prefer (an echo here of Joan's previously-quoted dilemma about skills-development against freedom of selection and design). Also, some pupils had sketched intentions on paper (such as the inclusion of lettering) that were proving very difficult to put into practice with their level of skill in the available time (leading Jenny to reflect that she needed to monitor more closely the pupils' intentions in future). She felt that the task set in textiles was proving more difficult to achieve in the time than the task in resistant materials.

The pupils in Tom's and Tony's groups used plywood to make a range of cut-out figures based on nursery rhyme characters. Tom reflected that he liked to teach skills on a need-to-know basis, feeling that this gave the greatest freedom for the pupils to develop their products. However, what this meant in practice was that he didn't have time to get round the whole group individually, so he tended to stop the class and do a demonstration of a particular technique to all the pupils. Tony once observed that he felt that this broke up the flow of the lesson for the majority of pupils. However, Tony was generally in favour of some skills being taught when needed, because he wanted pupils to be able to engage in "free design" because that kind of expression helped their personal development. By this he meant that he wanted pupils to *sketch* their intentions first without feeling too constrained by the constraints of the making process. He was, therefore, favouring the expressive side of design whilst perhaps not recognizing sufficiently the need to design within the known constraints of making. It is an example of the tension that exists when design seen as an expressive activity is linked with technology: a classroom-level example of the national debate outlined in Chapter 2.

The foregoing description of the pilot activity illustrates features of the approach to D&T that was to be adopted: the use of a theme; the focus on the designing and making of a product requiring skill development in one or other material; the IT contribution from BS. Some of the pedagogic tensions - the place of skill development; the ability of pupils to make sensible designs with limited knowledge of making processes - had their origins in CDT and HE and continued into D&T. There was also an expectation that the pupils would compile a folder with a record of what they were doing. It was emphasized that this was "for future reference as you move up the school" (Tom, to pupils). There was an expectation that a fair amount of this writing-up would be done as homework. In this case, considerable trouble had been taken to assemble a set of resource books from which pupils could get ideas, although designing and planning was something to be completed for homework, as was writing up progress on the projects.

This trial activity marks a noticeable feature of the change process: that when something

concrete was actually *done* with pupils, and what was done was subsequently analyzed and chatted about, this more than anything else permitted subsequent reflection and professional growth - part of the move from "storming" to "performing". It is also significant that many of the issues discussed related to pedagogy - broader issues of the nature of D&T (as considered in Chapter 2 as being part of the nature of a school subject) not being addressed. But in the early stages of planning at curriculum area level so much appeared to be less concrete than this trial activity - especially in the way the requirements were presented at national level through the statutory Order (DES/WO, 1990) and non-statutory guidance (NSG)(NCC, 1990) - and trying to discuss issues in the abstract contributed to many people's agitation.

Planning pupil activities for September 1990

In the curriculum area, planning for the actual Y7 course for September 1990 had continued alongside the trial activity. The outcome of this planning was a sequence of three kinds of activity. The first was a two-week integrated activity on designing, making and evaluating a nameplate. This would introduce the new pupils to all the staff involved, engage them briefly with the nature of D&T as represented in the four ATs, and have a practical outcome of a nameplate that the pupils would use in lessons while staff got to know them. The second was a series of three-week skills inputs, with pupils moving round a circus arrangement. The third was a project lasting thirteen weeks within the theme of *Entertainment*. In terms of the planning model of Figure 3.2, this overall proposal was the solution that emerged within the various constraints in this particular school. Internal constraints included timetabling, accommodation, staff availability and suitability, and the pedagogic requirements of the contributing departments. External constraints were also perceived (at least by Peter, Joan and Alison) through the various messages that seemed to be filtering through about the implementation of D&T from the NSG as well as the statutory Order which had been available in the school since Easter. It should be noted that there appeared to be little formal or informal discussion about the nature of design and technology in the world or in the curriculum: meaning was sought for the teaching

requirements as specified by the Order largely by comparing it with the existing fund of activities used in CDT, HE and BS, which had pedagogies that had developed within those subjects. Three features of the outcome of the planning process in this school shed further light on the struggle to develop an appropriate pedagogy for D&T: its overall shape, the use of a theme, and the place for the learning of skills. These need considering partly in the light of the expectations brought within the three subject departments, but also in the light of expectations in the NSG.

The NSG had reiterated various issues that had emerged in earlier documents: e.g.

the introduction of D&T should be planned to avoid fragmentation into areas such as CDT, IT, home economics, business studies and art & design, and to guarantee progression and balance ... some schools may choose ... a federal approach ... with departments ... taking responsibility for aspects of teaching. This approach has disadvantages because of the need for *pupils to choose materials appropriate to the task* (NCC, 1990, p.B8, my italics).

There was, therefore, a message that pupils should not be *required* to work in a given material. There was also the suggestion that:

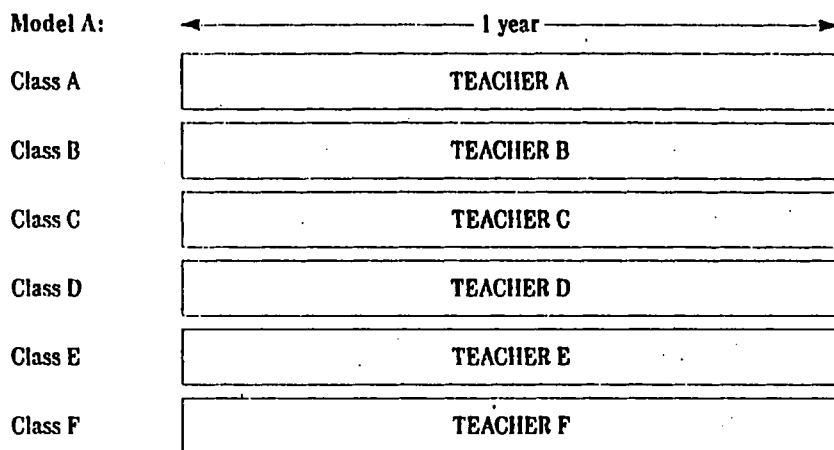
Most activities should include work towards all four attainment targets. Short activities may be used from time to time to develop experience, knowledge or skill in particular areas but these will not by themselves develop design and technological capability (NCC, 1990, p.C4).

The perceived message here (from the phrase "from time to time") was that any input of skills should be severely limited. Several models were offered in the NSG (Figure 5.5 - following two pages) as to how D&T could be taught (they were felt in the school to be rather late to be of great help, but better than nothing). The version in Upgrove School was most like Model B, adapted to favour pupils being able to choose their material. What emerges from the NCC models is the use of "themes" as the way of coordinating work between different areas. The concept of the theme as an organizing mechanism is introduced unproblematically by the NCC, and was adopted in Upgrove School.

The models which follow apply to key stage 3 and are based on a year group of 120 pupils taught by six teachers, although they can be adapted for different year and group sizes. Possible combinations of teachers include:

Art & design	1	1	1*
CDT	2	2	1
Business education	1	1	1
IT		1	1
Home economics	2	1	1
Science			1

* Art & design/CDT teacher



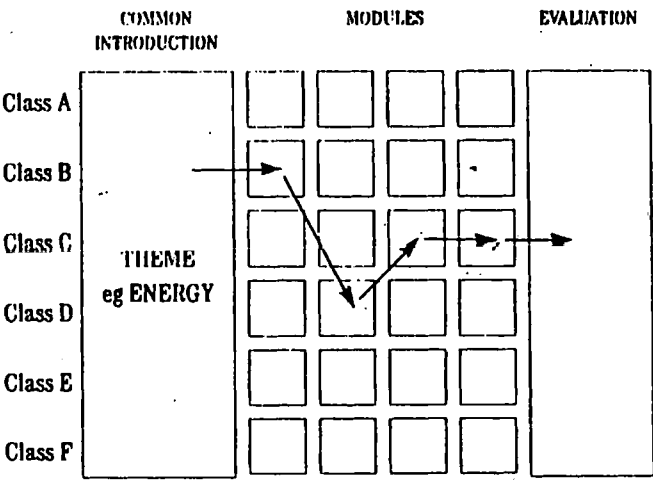
Each teacher has the same group throughout the year and is responsible for the whole scheme of work. Each room needs to be equipped for general design & technology work, with access to specialist materials and equipment.

Model B:

	COMMON INTRODUCTION	WORK WITH MEDIA / MATERIALS	OPTIONAL EVENT	EVALUATION
Class A		FOOD		
Class B		TEXTILES		
Class C		CONSTRUCTION MATERIALS 1		
Class D		CONSTRUCTION MATERIALS 2		
Class E		GRAPHICS		
Class F		INFORMATION		

One or more teachers introduce the theme to all the pupils, who then split up. Pupils do their designing and planning in any work area, but make their product in the area appropriate to the material they are using. Each area is staffed by an appropriate specialist.

Model C:



Examples of modules on energy:

- ways of storing energy;
- clothes for walkers;
- keeping things warm;
- cooking on a low budget;
- alternative sources of energy - windpower, wave power and solar energy.

After one teacher has introduced the theme to the half year group, pupils choose from modules based on the context. They come together at the end of the module for a joint presentation/evaluation session.

Model D:

Class A	INDUSTRY/BUSINESS	HOME	SCHOOL
Class B	ENVIRONMENT	INDUSTRY/BUSINESS	COMMUNITY
Class C	COMMUNITY	SCHOOL	INDUSTRY/BUSINESS
Class D	SCHOOL	RECREATION	INDUSTRY
Class E	HOME	INDUSTRY/BUSINESS	RECREATION
Class F	INDUSTRY/BUSINESS	COMMUNITY	HOME

Groups are introduced to different contexts, with each context chosen to encourage work with particular materials. Pupils work in an area resourced with the necessary materials.

Figure 5.5 Models of D&T projects from NCC In-set material.

I shall reflect more on the value of themes in subsequent chapters. For the moment it should be noted that this use of the word theme is rather more restricted than its use in the phrase "cross-curricular theme". It is simply meant to indicate some kind of unifying feature that provides a rationale to link activities in the various areas.

There was considerable debate within departments and, to some extent, in curriculum area meetings, about the relative place of skills, knowledge and process in the teaching of D&T. There was some feeling in CDT and HE that the teaching of skills out of an overall "context" or "theme" would be frowned upon by advisors or inspectors. As well as seeming to be the gist of the NSG, this was a legacy from an earlier overreaction to the straightforward teaching of skills that had brought about the change nationally from craft to CDT and an equivalent change within HE from "I demonstrate-you make" to "you investigate". Both CDT and HE staff felt that the need to move away from skills development had been previously communicated by I.e.a. advisory staff, and that limited emphasis on skills development would be a part of the D&T ethos (not least because this view was also coming through public statements from such people as Kelsey (p.43) who had been closely involved in the national development of D&T). There was a range of views, especially in CDT, about the place of skill development. Len and Phil favoured an approach through initial skill development, whereas Tom and Tony were more inclined to teach skills on a need-to-know basis. However, it is fair to say that there was a residual view on the part of most CDT and HE staff in Upgrove School that the only realistic way to enable pupils to develop the desired capability was to introduce pupils to some basic skills before requiring them to engage in design-based work. So the decision had been made that, after the short introductory activity, the first term and a bit of Y7 would be a "skills circus" with teaching groups moving round the various teachers in fairly rapid succession. There was some nervousness about this being acceptable, for example, in the event of an external inspection.²⁰

²⁰ Because I was known to be involved in in-set work I was asked on more than one occasion if I knew how other schools

It should be recalled that the BS staff had no experience of teaching below Y9, whereas CDT and HE had for some years been teaching pupils on a circus arrangement in Y7 and Y8 as well as Y9. So for the BS staff the problem of constructing some kind of meaning for the D&T Order so that they could suggest appropriate teaching inputs was compounded by an unfamiliarity with the teaching of the youngest pupils in the school. In fact, the BS staff continued to say that they would teach what they were required to teach provided someone would tell them, and were essentially reactive rather than proactive when it came to establishing their contribution within the curriculum area. When it came to determining the nature and content of the D&T lessons for Y7, therefore, CDT and HE ended up with a fairly clear idea of what they (separately) wanted to include, whereas BS responded to suggestions based on the Order and agreed between Peter, Joan and Sylvia.

What emerged was that in BS the emphasis was on basic IT literacy - the use of word processing, spreadsheet and database software. In CDT and HE the intention was twofold: partly to develop skills and partly to introduce pupils to "the design process" or "the investigative approach", depending on how the process aspect was described.²¹ This twofold approach was carried through into the teaching of D&T throughout Y7, and related directly to the approaches that I had discovered when observing the Y9 classes the previous year. Details of the first Y7 teaching materials will be given in Chapter 6.

By the end of summer term 1990, the intentions for the timetabling and staffing aspects of D&T were in place²², the battle with the timetabler had been fought and lost (D&T was to be taught in two quarter-day sessions, rather than a half day), and some issues of coordinated working had been evaluated through the trial run. "All" that remained for the HE staff was to work more or less right through the summer holiday (which they did) in

were tackling the issue (a question I answered by staying firmly on the fence). There was a great deal of uncertainty about the issue.

21 When talking about D&T (as opposed to continuing HE courses) the HE staff adopted the "design process" description.

22 A former HE teacher in the school, Barbara, had been recruited to return for a half timetable for the school year 1990-91.

moving in to their new accommodation ready for the start of the 1990-91 school year. The building work associated with the new accommodation had fallen behind schedule, resulting in this need for work through the holiday. The general pattern of the new HE accommodation was one large area with two main teaching spaces with between them an area for "designing". Each teaching space had some food equipment and some textiles equipment. According to Joan, this was "the set up for technology". Each teaching space could, therefore, support work in either medium. Unfortunately, neither space therefore had enough equipment to enable a whole group to work simultaneously in one medium. Joan observed that "this is the [i.e.a.] vision for the future for HE within technology, but I wish they'd share the vision with us!" (S). By chance, however, this fitted in with the need to teach sets in Y10 with sub-groups working in various media.

5.4 Summary

What decisions and events had affected the change process? Taking a nomothetic perspective on the school, certain decisions had been made that affected the school's organization, including the move (approved by negotiation in a formal forum) to a curriculum, option and timetable structure in line with the Head's perceived requirements of the national curriculum. A D&T curriculum area had been created, with a convenor appointed on his existing salary on a two-year basis, and a move had been taken to give physical expression to the unity of that curriculum area by moving the accommodation of one of the contributing departments adjacent to another. Various formal groups had been set up to provide a range of fora for discussion of the various change requirements (national curriculum, local financial management, etc) facing the school.

An idiographic perspective, however, adds an essential parallel dimension to the change process. Staff were feeling the effects of the changes as the work required of them in planning for the new curriculum impinged on the ever-present task of effectively teaching classes of pupils. Some questioned the need for some of the changes. Some were being shaken out of a way of working that had been all they had ever known as teachers. Some were feeling undervalued because of the impact of the changes on their existing subject, or

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deskilled because of the difficulty of constructing meaning from the new Order. Some were looking forward to the changes and wondering why others were making such heavy weather of it all. The evidence in support of the fifth hypothesis is that, in this school, there were many features at school, departmental and individual level that impeded the process of change, even though some staff felt quite strongly that D&T as it emerged was in line with their personal view of how they wanted to teach.

The absence of an effective national strategy to support teachers in the change (as suggested in the fourth hypothesis) was becoming apparent. The uncertainty about what would be acceptable teaching within the Order was beginning to highlight its shortcomings. Support in constructing meaning seemed lacking from this i.e.a., although there was support at the level of funding the new HE accommodation. The in-school structure of formal negotiation was struggling to achieve its purpose, because of the historical circumstances of the school in which such negotiation was minimal. The problem of the necessary negotiation between departments having different meaning structures was compounded in this curriculum area by the unfamiliarity of a formal system of negotiation and the physical difficulty of informal contacts. In the D&T curriculum area, neither the formal nor informal forms of negotiation were working as they should within the changed micropolitical environment brought into being by the head in response to the perceived national curriculum demands for cooperation between departments.

July 1990 marked the end of the period when D&T existed purely as something in the mind of its begetters at all levels. September 1990 was the time when groups of Y7 pupils would arrive in the curriculum area needing to be taught D&T. The next chapter is the account of the first year of implementation, which presents further evidence in support of the relevant hypotheses.

6 Implementing D&T in Y7: September 1990 to July 1991

6.1 Introduction

When Y7 pupils arrived in September 1990 needing to be taught D&T, the devolved responsibility for implementing the Order rested with the curriculum area, its three heads of department in general, and the teachers assigned to Y7 groups in particular. The general form and content of the first set of skills inputs (15 weeks in total) and the first project (duration 13 weeks) had been established (as outlined in Chapter 5), although important details of the project phase remained to be worked out. Taking the teaching groups through five three-week skills inputs gave the staff a brief breathing space to iron out these details, but nevertheless provided the first real test of teaching within the D&T Order. Several aspects of implementation are explored in this chapter, because they illustrate different aspects of the change process. Section 6.2 considers one aspect of departmental planning in order to implement D&T in Y7: the timetabling of CDT staff. This was Peter's responsibility as head of CDT: the responsibility for deciding who should contribute from BS and HE being with Sylvia and Joan respectively. Discussion of the timetable with Peter provided the opportunity to discover his approach to several of his responsibilities as a manager of change at departmental level and also to discover some of the tensions of the convenor's job. The annual solving of the timetable puzzle shows the impact on the change process of school, departmental and individual circumstances: highlighting how implementation problems have to be solved at local level. Section 6.3 considers various aspects of D&T implementation as revealed by the nature of the skills inputs and the way they were taught. Because I was "shadowing" one group of pupils through this circus, I had the opportunity to discuss with members of each of the three departments why they had selected particular material and why they were teaching it as they did. It also enabled close observation of teachers at work, revealing important features of the task of being a teacher of a practical subject. In terms of understanding the change process, therefore, this section gives important insights into the interaction between existing classroom practice and a newly-specified curriculum. Section 6.4 then considers the particular issue of assessment that brought to a head differences of pedagogy and interpretation of the

meaning of the statutory Order. Discussion of this issue with staff revealed how the members of the contributing departments were constructing different meanings from the Order and responding differently to the overall power-coercive nature of the government's strategy. The changed micropolitical environment of the school, and the failure of informal and formal mechanisms of negotiation, contributed to difficulties for the staff attempting to effect change. Section 6.5 reflects on the resolution of this and other problems of implementation, showing how such issues need to be dealt with at school level.

6.2 Aspects of implementation revealed by a departmental timetable

In Chapter 3 I drew attention to the inadequacy of a view of teaching that represented teachers as almost interchangeably fulfilling a role within an organization. The point being made was that each teacher brings a unique experience and set of abilities to a teaching situation. Consequently, in the process of change, it cannot be assumed that teachers will respond uniformly, or that pupils will experience the same curriculum from different teachers even if that curriculum is uniformly specified. The unique nature of each member of staff is illustrated by taking a closer look at the decisions that have been taken, and the thinking behind them, in the making of a timetable. It also reveals how a multitude of factors (teacher ability and experience; teaching group size; pupils' response to option choices; etc.) have to be taken into account and how the outcome has to contain compromise. It also demonstrates that a timetable represents a solution within one year's set of constraints, and that a different solution with different constraints will have to be commenced in about nine months' time. In terms of the planning model of Figure 3.2, the way in which staff can be timetabled against teaching groups is also one influence internal to the school on the planning of curriculum implementation.

Negotiating with the timetabler about the placing of staff names against teaching groups *within CDT* was Peter's ultimate responsibility, after he had discussed his intentions with the staff involved. For the 1990-91 school year he produced printed copies of a *CDT department* timetable for the five CDT teachers: there being no timetable circulating that showed the whole D&T curriculum area, unless one went to look at the whole-school

timetable. The BS and HE departments made their own decisions and representations to the timetabler and the HE staff had decided that all three¹ would be involved in teaching Y7 groups, on a shared basis (reinforcing the collegial approach within this department). Thus, responsibility for timetabling was operating at "departmental" level, and had not yet become an issue for debate and coordination within the whole curriculum area. This was one aspect of its transitional nature. This does need to be seen in the context that only one of the seven years in the school (Y7) needed to be taught D&T this year: the rest of the years still being on BS, CDT and HE courses. Peter observed that he was content to live with this way of determining the timetable this year, except that he had one concern that BS had timetabled a non-specialist (Kay)² into one of their Y7 D&T slots, because of "other commitments" on the part of the full-time BS staff. He would have preferred to timetable himself in that slot if other commitments had allowed it. It might suggest that the priorities of BS were in their own area. However, Eleanor was timetabled for one Y7 group in the other half year.

Figure 6.1 (overleaf) shows the timetable in a year-by-year format as it links CDT staff with classes. This format allows easier analysis than the usual period-by-period format: classes are shown on year lines from 13 down to 7. Thus, 13 DES 4 is a Y13 class taught for 4 periods. Further notes on the abbreviations used are included with the Figure.

1 Jenny and Mary had left and Barbara had been appointed on a half timetable to join Joan and Alison. Barbara had previously taught HE in the school, having not worked when she had young children. On her return half time she adopted quite a low profile in formal meetings, feeling that she had a considerable amount of "catching up" to do. In her teaching of D&T, she appeared initially to conform to the approach favoured by Joan and Alison.

2 Kay had begun teaching some typing within BS in previous years. Her main commitment was to games/PE. According to Sylvia, Kay had sufficient typing ability to be of use to BS, and was "picking up" the IT skills as she went along. Therefore her contribution to D&T would be likely to be in the IT area.

PETER	PHIL	LEN	TOM	TONY	
13 DES 4	13 DES 4				
12 DES 4	12 DES 4				
	11A D&C 4				
	11B D&C 4				
		11C D&R 4			
			11D D&R 2	11D D&R 2	
11E TEC 4					
11F TEC 2				11F TEC 2	
	10A D&C 4				
		10B D&R 4			
		10C D&R 2	10C D&R 2		
10D TEC 4				10D TEC 4	
				10E TEC 4	
9 CDT 4	9 CDT 2	9 CDT 6	9 CDT 4	9 CDT 4	
8 CDT 2	8 CDT 4	8 CDT 6	8 CDT 6	8 CDT 6	
			7 D&T 8	7 D&T 8	
24	26	22	22	30	CDT
8	8	11	13	3	extra
32	34	33	35	33	Total

DES is "A" level design

D&C is GCSE CD1: Design and Communication

D&R is GCSE CDT: Design and Realisation

TEC is GCSE CDT: Technology

CDT is the department's contribution to the courses that include HE in Y8 and HE and BS in Y9.

D&T is the national curriculum Y7 course integrated with HE and BS.

Figure 6.1 CDT timetable for the school year 1990-91.

The following observations on the timetable are derived from a conversation that I held with Peter near the beginning of the school year, when I had had an opportunity to look in detail at the timetable, and to prepare some questions. His responses reveal some of the staffing constraints within which he was constructing the timetable, as well as providing further glimpses of the nature of some staff.

The responses also clarify aspects of how he was managing the staffing aspect of the change to D&T, and also reveal how he was concerned to develop the staff in his own department. Relevant points from conversations with other staff have been included as appropriate.³

Peter and Phil share the A-level design teaching. I have previously noted that Phil had initiated the course in 1985 - the year before Peter took up his post in the school. Peter had already been teaching the syllabus for some years in his previous school, but is content to share the teaching with Phil. According to Peter they complement each other - Phil's skills are primarily in the presentation area whereas Peter's are more in the constructional area. They have adopted the approach of sitting down at the beginning of the year and deciding between them who will teach what. Phil then goes off and produces a detailed written plan to which they adhere. That isn't the way Peter used to operate in his previous school (being more unstructured in his approach) but he "goes along" with the way Phil arranges it. It is worth noting how Phil's approach to teaching A-level is consistent with his declared views about keeping a close control on what pupils are doing in order to keep up expectations and achieve high quality work. Peter's acceptance of Phil's way of planning the work indicates an accommodating style on Peter's part. This is typical of his approach to managing his own CDT staff - not seeking unnecessarily to impose his own way of doing things. He prefers to negotiate and re-educate: acknowledging existing norms. Given time, this was a good way of moving his own staff in the direction required by D&T.

³ The subsequent observations are presented in the present tense, because they derive directly from a conversation about the (then) current situation.

Unfortunately, time was not on his side. Another point that will emerge later as being of importance is that the long timescale implicit in his own management style did not match the approach taken in HE, where change was brought into effect rapidly.

CDT: Design and Communication is taught by Phil. I have previously noted how this is his subject, taught (very successfully in terms of pupil commitment and exam results) in his way in his room. This year there is only one D&C group in Y10, compared with two in Y11. Historically there had been two sets each year with Phil teaching both. This year's single set was another consequence of the one-choice option system operated for this Y11. At least Phil has one viable set (compared with the situation in HE), but Phil suspects it is the thin end of a very large wedge, this being seen by Phil as evidence for his own hypothesis about the decline of his subject. Phil also makes a contribution in the Y8 and Y9 circuses: these are skills inputs based on orthographic and isometric projection techniques. This year, therefore, the only consequence of reorganization towards the national curriculum has been the loss of a D&C set in Y10. The actual implementation of D&T in Y7 has not yet required any teaching contribution from Phil. His current feelings about D&T are, therefore, based on his (partially confirmed) perception that his specialist contribution will be marginalized, his "subject" devalued and himself deskilled. An important point is that Phil has in effect a "subject" timetable slot that is all his own (in contrast with D&R and TEC which are not the sole preserve of one teacher). On the one hand this enables him to concentrate on teaching his specialism in an effective way. On the other hand it a) reduces flexibility in the department as a whole, by making Phil unavailable for other subject areas and preventing other staff from teaching in Phil's subject area, and b) marks out a territory that other teachers may find it difficult to enter, even if they have relevant skills and expertise. It should be noted that Phil's occasional involvement (on his terms) of other staff in "his" area of work is another aspect of his wish to retain tight control of what he considers his prime responsibility, as the following instances show. The first head remembered that Phil would "invite" him to give a few lessons on economic aspects of industrial projects to Phil's A-level students. Phil also asked Tony to run a session on aspects of graphic design because Tony was newly-trained

and brought different insights. But the converse of this was that Tony felt rather inhibited in his early terms at expressing his own design ideas because Phil seemed to have a monopoly in that area.⁴

A large proportion of D&R is taught by Len. He directs the pupils towards realising in wood as often as possible, with some plastic work, grumbling still about "messaging about" with designing instead of just getting on and making. When Peter arrived in the school, just as CDT GCSE courses were starting in Y10, he taught alongside Len in that first year to lead him through the "design approach". Peter feels that Len now does this adequately, although his approach puts constraints on the pupils, and his clear focus on working in wood tends to limit the options within realisation for pupils doing this course with Len. Len has to teach D&R because he hasn't the skills to teach D&C or TEC, so this gives Peter the problem of getting other staff in to D&R so that the pupils' realisation options can be widened and staffing flexibility increased. Again, therefore, Len's relatively narrow specialism comprises a constraint on the flexibility of the department's timetable. Peter's approach to staff development - getting alongside a colleague in the task of teaching - is another example of Peter's willingness to address change through re-educative activity.

The 11D D&R group is split two periods each between Tom and Tony. This is deliberate policy on Peter's part, and the idea for the pairing was partly prompted because Peter had observed how Tom and Tony worked well together on the previous term's trialling of the new Y7 course. Peter is building on that relationship but is also pushing Tom (who on his own admission is reluctant to teach either older pupils or in metal) and Tony (who is relatively competent in metal but is still a relative beginner at teaching) into new areas both for their own development and for greater departmental flexibility. So this single feature of the timetable addresses several agendas from the point of view of management of the department - both in terms of staff development and timetabling flexibility.

⁴ Tony gradually overcame his reticence in this area as he became established, and his working space began to show expressions of his own style.

By comparison with the arrangement deliberately chosen above, the sharing of 11F CDT: Technology was rather forced by timetabling constraints (Peter being unavailable for all four periods). Peter sees this course as his prime responsibility, and the evidence is that the other members of the department agree with this. However, he has been able to get Tony sharing with him and thinks that will do Tony good. But it imposes on Peter a need to do on-the-job training for Tony, who has no background in electronics and other necessary areas (despite having just been trained as a CDT/D&T teacher). This arrangement for on-the-job training is in line with Peter's strategy for staff development, but at the beginning of the year he was wondering where he would find the time, given everything else that needed doing.

10D TEC is team taught in adjacent open-plan spaces between Peter and Tony (rather than shared) because it is a group that is too large (28) to be accommodated in one teaching space. This is genuine team teaching, with each teacher allocated for all four periods (unlike the sets shared two and two), so is seen as a good opportunity for on-the-job training for Tony. It is clear that this year, Tony has considerable opportunities to develop his expertise and benefit from Peter's experience.

Tom and Tony are both heavily committed in the lower years. This is by choice on Tom's part and mainly through limited experience on Tony's part. Tom doesn't want to teach higher up, feeling that he relates better to younger pupils, but Tony wants to if he stays in the school more than a few years. Tom and Tony are both personally strongly committed to the integrating philosophy underlying the Y7 course. For Tom it is what he has "always advocated" and for Tony it is "the way it was presented at college". For these two, the national curriculum is seen currently as an enabling framework rather than as a straitjacket.

All the CDT staff do some teaching that is unrelated to their own department. Some do this by choice, for example Tom teaches some art and Peter some computing. However, it is Len who is having to "fill" his timetable with extras that have to be found rather than chosen by himself. Inevitably, this gives him some periods on his timetable that he finds

less than satisfactory. So, although he is not having to teach the new curriculum, its implementation is affecting his job satisfaction. Phil's and Tom's particular wishes are also being accommodated at the moment and a loss of what flexibility there is could force the issue of what they teach and where, especially as D&T moves up the years.

The foregoing discussion of the 1990-91 CDT timetable has revealed an important internal constraint on the introduction of D&T in Y7: staff availability and suitability. Also, it has revealed how the introduction of D&T was one of many issues to be addressed, and it highlights the fact that the process of D&T implementation had in this respect an annual cycle. As the D&T curriculum moved up the school there would be more pressure on Phil and Len to contribute to D&T. Len did not want to teach the new curriculum and Peter did not particularly want him to. Lurking in the background was the issue as to when Len could take early retirement, because he had reached the age where it could be an option and was inclined to think that way provided the financial terms were acceptable. Peter knew that Len would not be replaced but also recognized that the "extra" lessons done by CDT teachers (outside their department) added up to approximately one person. So he thought they could get by on one fewer person. The CDT department was also slightly overstaffed at that time - Tony's permanent appointment at the same time as Jenny's temporary appointment in HE putting the combined CDT plus HE staffing rather on the generous side. Partly as a consequence of the reduction in GCSE sets in HE in Y10 for 1990-91, the HE staffing had been reduced from 3+ to 2+ (adding to HE's sense of declining presence).

The single activity of making the timetable illustrates the mixture of school level, departmental, and individual issues that were involved in this single year's solution to the staffing of D&T. It also illustrates the impact on the process of implementation of the nature of the individual teachers involved. In CDT the timetable had to be crafted round these individuals. In HE this was less the case: there being generally greater willingness to adapt and be flexible on the part of the HE staff. In BS the agenda was more to protect the interests of existing BS courses first - D&T appearing to be a relatively low priority and all

the staff approaching it along the lines of needing to be told what to do. The school level process of negotiation with the deputy head was micro-political: haggling over details as they emerged. The assignation of staff to the teaching of D&T from BS and HE indicated the response from these interest groups (BS making it low priority and HE being totally involved) and was also an outcome of school micropolitics with departmental agendas in this instance being more significant than curriculum area ones. The overall outcome of teachers timetabled against groups of pupils became part of the context for the year's teaching, providing its own constraints and possibilities. As far as Peter was concerned, it provided mainly good staffing of the new D&T course, as well as staffing the existing courses in Y8 to Y13 as far as possible to the strengths of the staff. He was also able to take the opportunity for putting some staff in a position where their development could take place. With staff not used to taking advantage of In-set opportunities (and not being pushed in that direction by the first head), the in-house work done by Peter was clearly valuable. Having looked in detail at the CDT timetable as an outcome of a particular constrained planning process within the overall change process, it is now appropriate to turn to the nature of the first D&T teaching that was done in September 1990.

6.3 The skills inputs: the emerging approach to D&T teaching

Edging forwards

It will be recalled from Chapter 5 that this series of skills inputs on a three-week circus basis would provide the Y7 pupils with the basic skills to tackle the subsequent thirteen-week design-and-make project. The skills inputs and the project were nominally within the *Entertainment* theme, which was the justification for the separate initial teaching of skills. Over the whole of the combined period of the skills inputs and project, the intention was to fulfil a selection of D&T Programmes of Study and, at some stage, each of the four D&T Attainment Targets. There was still great uncertainty about whether or not particular content presented in a particular way would fulfil the requirements of the Order. The question "Is this it?" (asked implicitly or explicitly - "it" being what is wanted by whoever established and is perceived as likely to oversee the implementation of the Order) was

being asked throughout the period of the study in the school.⁵ In Upgrove School the question was asked most persistently by the HE teachers as they struggled with the Order, and it was asked because it was felt that someone should have an answer. The question is indicative of the problems of interpretation inherent in the Order - compounded by the lack of an effective strategy of either communicating more clearly what the meaning of the Order was or of helping teachers to construct their meaning. However, alongside this continuing doubt about whether or not what was intended for teaching was "it", the Y7 skills circus got under way. The staff involved in Y7 D&T were, from BS Eleanor and Kay, from CDT Tom and Tony, and from HE Joan, Alison and Barbara who shared two timetable slots between them so that they were all involved (another approach to staff development, which also maximized the opportunity for discussing and developing the pupil activities). The pupils were timetabled for D&T in two half-years with five teaching groups in each, requiring altogether twenty 70-minute lessons per week (Figure 6.2 overleaf).

Tom and Tony were each teaching a different group in each half year (two groups each), whereas Eleanor and Kay each taught one group only in different half years. Most members of staff, therefore, saw five groups through each activity, whereas Tom and Tony saw ten. The pupils each experienced five skills inputs in textiles, food, metal/plastics, wood and IT. Some of the activities (textiles, food and metal/plastics) were overtly identified as being within the overall *Entertainment* theme, but this was not consistently done. Each activity will be described briefly, so that observations can be made on this first evidence of the nature of D&T as implemented in the school.

In the *textiles* area, pupils had to individually design, make and evaluate a mask. The pupils received a 5-page booklet headed "Design and Technology" and subtitled "Project 2: Entertaining, Skill area: textiles". This contained planning sheets and spaces for all

⁵ It was asked of me in the school (until the staff realized I wouldn't answer), but it was also echoed whenever I talked with teachers in other schools and, significantly, advisory staff in various I.e.a's.

GROUP						
HALF YEAR	1	HE	HE	CDT TONY	CDT TOM	BS ELEANOR
	2	HE	CDT TONY	CDT TOM	BS ELEANOR	HE
	3	CDT TONY	CAT TOM	BS ELEANOR	HE	HE
	4	CDT TOM	BS ELEANOR	HE	HE	CDT TONY
	5	BS ELEANOR	HE	HE	CDT TONY	CDT TOM
HALF YEAR	6	HE	HE	CDT TONY	CDT TOM	BS KAY
	7	HE	CDT TONY	CDT TOM	BS KAY	HE
	8	CDT TONY	CDT TOM	BS KAY	HE	HE
	9	CDT TOM	BS KAY	HE	HE	CDT TONY
	10	BS KAY	HE	HE	CDT TONY	CDT TOM

Figure 6.2 Timetabling of Y7 groups for skills inputs.

necessary written and graphic work which provided a structure within which the pupils could record what they had done. One planning sheet provided the pupils with definite targets for each lesson. Also available were spaces for two "design ideas" and a "design sheet" for the final design. Space was available for the inclusion of samples of sewing. At all stages there were evaluative questions for the pupils to answer, and an evaluation sheet for the whole project was included. Although this was a complete mini-project, the main aim was to enable pupils to learn the use of a sewing machine. The threading-up of the machine was a skill that had to be demonstrated by each pupil to the teacher before the end of the three weeks. Towards the end of the last lesson, another group of pupils were brought in to look at the display of masks and booklets. This was done partly for purposes of evaluation of one group's products by an "outside" group, but also served as a motivating factor for pupils to complete what they were doing to a high standard. The activity was typical of the tightly-structured approach used in HE where pupils were given very clear targets to aim for each lesson. The approach to designing - generate several alternatives and then choose one to be developed in detail - was exactly comparable with the approach commonly used in the CDT area.

In the *food* activity the tasks for the pupils were first in teams of four and then individually to prepare various food dishes. In the first lesson, the pupils were given a plan of the HE room which they had to fill in to locate equipment, etc. and they were told that the intention was to develop group and personal skills so that work could be accomplished safely and effectively. Again, the various activities were highly structured in terms of timekeeping, and what was expected each lesson, and choice of dish was controlled. In making a fruit salad, the teams of pupils had to cooperate in deciding who would provide and prepare particular constituents. In subsequent lessons, individual pupils made different items. This activity had to be carefully controlled because the new HE accommodation had a limited number of cookers in each teaching space. It should be noted that the practical difficulties of using the new accommodation only became apparent as groups were taught in them, revealing further influences on curriculum planning.

In *metal/plastics*, individual pupils had to design, make and evaluate a tangram (a small metal puzzle) - an activity suggested and taught by Tony. The first lesson was mostly taken up with a discussion of workshop safety through reference to a "safety sheet" given to pupils. The pupils then received two sheets headed "First year technology" and subtitled "Mini project theme - Tangrams". There was a design brief - in effect a specification against which the finished item could be evaluated. Some verbal instructions were given which complemented those on the sheets. The pupils had to plan several tangrams on duplicated grids and then select one for making. The emphasis in the making process was on accurate setting-out and cutting, so that the tangram would fit together well. The finished tangrams were assembled by Tony in groups of eight so that a small polystyrene container could be vacuum-formed (by demonstration).

The *wood* activity, taught by Tom, was to design and make a plywood nameplate, developing the previous nameplate in a different material and to a larger size. The first session was an introduction to the safe use of various tools. The emphasis in the remaining sessions was on developing the skills of safe working and appropriate techniques, whilst allowing some license in forming the letters and choosing the finish. As was often the case with Tom, the design process in this instance had been outlined on the board. Teaching was by whole-class sessions interspersed with the children's individual activity.

The tasks in BS were to work in pairs on computer-based activities that introduced word-processing (basic introduction to text handling with Word software), spreadsheet (basic handling of figures with Multiplan software) and creation of titling/graphics (using Caxton/Paintspa software). Sheets were used to give information and throughout all the lessons the emphasis was on pupils working on machines (given the constraint of one machine between two pupils). There was a printed check list on which each pupil had to tick that a task had been accomplished. There was no identification of an overall D&T context on these sheets (neither identification of the D&T curriculum area nor reference to the *Entertainment* theme), although that was given in a verbal introduction at the beginning of the first lesson.

In all of these activities, the staff had taken work that they were familiar with (Tony had been introduced to the tangram at college) and had adapted it to suit the skills inputs. In fact, each of the skills inputs in CDT and HE *did* provide a "design" context in which the skills were developed. Aspects of all the CDT and HE activities could be mapped across to ATs 2 to 4, and the food activity also had an aspect of AT1. However, the IT input from BS did not meet any of the D&T ATs, although it did meet statements in AT5⁶: an early sign of the difference between the initial contributions from CDT-HE and BS. The fact that the skills inputs were repeated with five groups of pupils provided the opportunity to observe how, if at all, the staff developed the activities, and it is interesting to consider some examples of such development.

Reflective practice and tinkering: a reflection on small-scale change

In the skills activity phase each teacher was contributing an activity within the overall view of what skills would be needed for the project part of the theme. The three departments still had firm views about what was necessary to provide a basis for future work with their specialist materials: keeping an eye on the retention of the integrity of their own subject. What the skills inputs demonstrated was that, within the major changes at school and departmental level required by the introduction of D&T, there was the smaller-scale improvement of activities carried out with the purpose of improving pupils' learning experience.⁷ Although the skills inputs were quite short and tightly controlled, many of them were subject to Huberman's "tinkering" to some degree between successive groups. In HE, part of this was connected with gaining familiarity with working in the new accommodation as well as wanting to improve the activity *as such*. In BS part of it was connected with having younger children, fresh out of primary school, working on the network of machines. As Eleanor observed: "I can't get them to sit down at the machines

⁶ The Information Technology attainment target.

⁷ I observed the skills inputs by moving round them with a group of pupils. However, from time to time I revisited teachers with other groups in order to see how, if at all, the activity had been developed.

for more than a minute!" (S). In BS it was also to do with wanting to make the activity more in line with the perceived requirements of D&T as requiring a "design" context. Eleanor said that reflecting on the activity with Tom (she and Tom regularly sat in the same social circle in the main staffroom) had actually given her ideas about how to improve the activity and make it more interesting for the pupils than a simple copy-type exercise. So here was some informal discussion (according to the classification of Weston, 1979) and professional development as well as activity improvement. Tom himself made confident noises that the activity he was offering was appropriate. It was a development of a previous activity, so he was quite confident about the practicalities.⁸

As previously outlined, Tony's three-week activity consisted of getting the pupils to design and make a tangram - a small pattern-making toy based on cutting a 50 mm square of metal into shapes. The introductory sheet told pupils that:

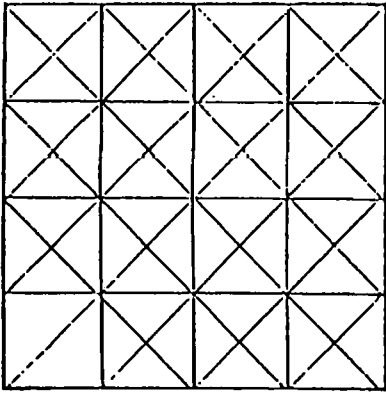
Tangrams are traditional puzzles that have their origins in ancient China and resemble the modern western jigsaw puzzle. However, unlike the jigsaw puzzle which has only one solution, the tangram can have many possible solutions (pupil worksheet, September 1990).

Figure 6.3 (overleaf) shows parts of the planning sheet: spare grids for further design attempts were available for pupils who wanted them.

Tony's first group was allowed to make up to 12 tans, and the pupils were allowed to choose from copper, aluminium or steel sheet to make the tans - the idea being to allow a range of colours. The first run through the activity showed that 12 tans was proving too many tans that were too small for the pupils to work with accurately with the available equipment in the time available. Therefore, the maximum number of tans was reduced for the second group - cutting down on the flexibility of the resulting tangram but enabling a

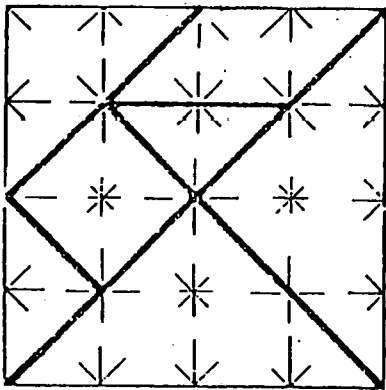
⁸ Tom's slightly cavalier approach to the national curriculum became apparent when he fetched his relatively pristine D&T Order off the shelf and ask me to help him map this activity against it.

TANGRAM PROJECT



The diagram on the left shows the basic layout for starting a tangram.

The lower square illustrates a set of seven tans. The shapes (tans) are made by using only the guide lines produced on the planning squares.



DESIGN BRIEF

Design a tangram system which is different from the example. It must contain between 7 and 12 tans with at least three different sizes of triangle and one square.

Start by dividing the planning square into two halves with a diagonal line, then decide where the various tans are going to be placed.

DO NOT FORGET

- 1) Between 7 and 12 tans.
- 2) At least 3 different triangle sizes.
- 3) At least one square.
- 4) Start by drawing a diagonal line.
- 5) Use the guide lines only.

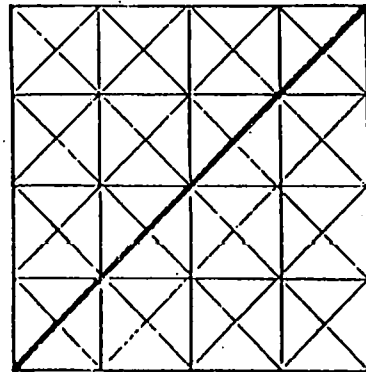


Figure 6.3 Tangram planning sheets.

better finish in the time available. Also, the steel and copper were proving difficult to cut with the available hand snips, so Tony subsequently sacrificed the option of having various colours and allowed the pupils only to use aluminium. Although one major aim for this activity was an introduction to the use of marking-out tools and sheet-metal cutting and finishing tools, the whole activity was based around the pupils designing their own tangram that they would take home. In continually evaluating the activity in terms of its appropriateness for the pupils within the short time available he was reflectively tinkering - concerned that the pupils should get the very best educational experience out of the task he set, as well as having an attractive and well-finished little artefact to take away with them. It was a repeated view of Tony's that "the kids should get pleasure out of what they're making". He was all for D&T "satisfying needs" up to a point, but, for Tony, the letter of the law of D&T was secondary to the pupils doing something that they enjoyed doing. The rationale was quite simple, and not unlike that of the first head: pupils who are interested will be motivated. There was a great deal of this kind of informal evaluation of activities by individual teachers and between those teachers who made use of opportunities for informal contact.

I turn now from a consideration of an example of the way in which staff were evaluating and refining the activities to a reflection on a detailed observation of one lesson. In Chapter 3 I used other researchers' views about the nature of the job of teaching to suggest the need to take more seriously the influence it made on a teacher's reaction to a requirement to change the curriculum. Within my thesis, therefore, it is important to confirm the nature of this central feature of curriculum implementation: the classroom work of a teacher of a practical subject.

All in seventy minutes' work

The following description relates to an account of one lesson taught by Alison.⁹ It is based

⁹ As a result of discussing with Alison some details of one of her lessons, she asked me to make a detailed observation of one of her lessons which we would subsequently discuss. She had her own reasons for asking for this (she was interested in how

on notes made during the lesson, and the present tense is used in description. Between bullet points indicating aspects of Alison's task are interspersed my own reflections on what she was doing, as recorded immediately after the lesson.

This particular lesson is taking place in one of the newly re-furbished HE rooms, equipped to the most recent I.e.a. specification, intended to enable the children and teacher to work effectively through an "investigative" approach. I use the word "children" deliberately, because the class who are in the room are Y7 i.e. twelve-year-olds in their first few weeks of secondary schooling. When they arrived in the room from a previous lesson some were carrying bags that are almost as big as themselves. Some looked slightly apprehensive and almost overwhelmed. Others appeared nonchalant and comfortable. Some appeared tired, some full of life. Now, however, the lesson is well underway. The children are all busily occupied, as is the teacher. At the end of the lesson, assessment sheets will be filled in that report on the children's progress towards national curriculum attainment targets. I wrote down during and after the lesson, and in no particular order of priority, eleven different things the teacher was doing. At the very least she was:

- keeping a group of lively boys and girls moving for 70 minutes through her intended programme.

All of these children brought to the lesson their own agendas for the 70 minutes: the final 70 minutes of a long and active day. Each has an individual personality and set of domestic and personal circumstances, a degree of knowledge and skill and some understanding about the subject matter of the lesson but within their personal and possibly idiosyncratic framework for making sense of the world. The teacher's intended programme did not just happen - it had been thought out in the light of a whole range of practical and pedagogical factors as a likely way of ensuring motivation and success for each pupil and,

well she was signposting pupils through the activity), but I was happy to comply with the request because it seemed unlikely to encroach on my own research agenda, which was not concerned with this level of detail. The lesson observation gave me the opportunity for subsequent discussion of a range of issues about D&T.

at the same time, moving each within D&T PoS towards identified D&T ATs.

- enabling the children to work independently on tasks they had selected from a range

D&T was interpreted as requiring personal identification of tasks by pupils. That cannot be completely open-ended at this stage, because of the lack of experience of the children, so the teacher had already used her experience to select a wide range of tasks, any one of which would enable a child to succeed and achieve most of the objectives for the lesson. That has an implication for children's progress and for record-keeping, of course, because although there will be skills generic to a range of tasks, there will be some that are specific to one task. The teacher has a recording system to keep track of all this.

- helping the children to learn how to work as a group, rather than as a series of isolated individuals

D&T was felt to require some co-operative group work. Quite apart from this, when there isn't enough equipment to go round, because that is the way the room is designed, there has to be co-operation within the whole class even when children are working individually. And a given child, wanting to finish a particular task before the bell goes, can be quite single-minded if the alternative means queuing patiently for equipment, especially if he is a largish youth and it is a smallish girl who is in his way struggling with an unfamiliar piece of equipment.

- keeping a watch out for children either deliberately or (far more likely) inadvertently injuring themselves or others with some of the potentially dangerous equipment in the room

D&T requires children to gain first-hand experience in using equipment. Some materials necessarily have to be formed with very sharp tools (in this case, a kitchen knife) and, in some circumstances, the only way of achieving a given operation is by using a power tool (in this case a food whisk), heating element, or similar device. It may also be that features of the layout of the room mitigate against safest procedures (even though its design is the

latest I.e.a. vision) as the children necessarily move around with tools and equipment. It is necessary only to look at home accident statistics, never mind industrial ones, to realize the care that teachers must apply in practical situations.

- building relationships with the whole group and with individuals

Keeping discipline, handling group dynamics, and, at the same time being approachable by all the pupils is a profoundly testing and exhausting activity for any human.

- observing the children as they worked in order to make a sensible and useful comment on their assessment sheet

A teacher is continually monitoring responses during, and products of, the various activities of the children. For helpful comments to be made, the teacher needs to remember how a child has performed in the past, in order that appropriate encouragement and help can be given.

- realising that some of the proprietary source material being used by the pupils was not enabling them to achieve just the right results and so adapting the material "on the hoof" from her own experience so that the children would succeed
- responding to the fact that some of the activities were taking some inexperienced children longer than might be expected, so having to keep an eye on the clock because many of the children need to catch the bus home
- realizing that some of the specialized equipment in the room was not performing correctly, and guiding children away from it, whilst not imposing on those already using it

A teacher likes to be able to make use of resource material published for the course being taught. It will be evaluated and vetted in advance, of course, but there will come a time when it is used by children for the first time. It may not be just right. Then it is that the in-depth knowledge of a particular material or process is brought to bear on the situation. Teachers will have such specialist and practitioner knowledge in a relatively small area of

the curriculum, wherein they can perform as reflective practitioners with their pupils.

- all the while evaluating what was going on because this is a new activity in a new room which has to be repeated with other groups

Implementing the new curriculum requires a continual process of creative development and invention: the process of change having to take place simultaneously with all the day-to-day aspects of the job.

- keeping her own self-composure and presenting an approachable yet confident and firm image to the children

All teachers make decisions all the time about how to disclose themselves to their pupils. As in all human relationships some work better than others and different children will respond in different ways to different teaching styles. Many outsiders would take for granted the teacher-pupil relationship, but it is a complex thing affected by many factors both inside and outside school.

The list, I am sure, does not stop there. What enabled the teacher to do all this? In no special order, I suggest years of experience, subject expertise (theoretical and practical), thorough preparation before the lesson, personality, familiarity with the children's work and with the room, hours of work getting to grips with the new national curriculum documents and seeing how this particular lesson would contribute to the satisfaction of some or other attainment target.

I observed a fair sample of lessons in the course of fieldwork in the D&T curriculum area, and all of them exhibited these kinds of characteristics in some combination. Each member of staff has a practitioner capability rooted in a familiarity with certain materials and processes that enables the safe conduct of lessons that offer valid educational experiences within a subject that contextualises the activities in some coherent meaning structure. I believe that the evidence of my own classroom observation fully supports the opinion of those researchers (such as Hargreaves and Fullan, 1992) who claim that the teacher is the

key to any kind of educational improvement. The particular burden of my own observations is that the routine practice of teaching, as exemplified in the above account, is embedded in normative subject meanings and practices. These norms differ between subjects, and the teaching of a new subject requiring new normative meanings and practices (such as D&T) cannot simply be expected to be introduced by teachers rapidly creating these new norms from their existing experience.

Various issues have arisen from observation of the skills inputs that preceded the thirteen-week project. Turning now to the project itself, it seemed likely that the teachers contributing their own expertise within D&T needed to begin to work cooperatively in a way that they were not used to. This related particularly to cooperating in passing information back to the pupils' mentors, but also in being prepared to use the formal forum of the curriculum area meeting to discuss planning issues. As the skills inputs proceeded, discussions were taking place and decisions were being made about the details of the project. This raised further issues of concern for staff, and moved the process of implementation into another phase.

How should the main project be taught and how should the D&T staff team operate?

I noted in Chapter 5 that the approach to the first two terms of Y7 work emerged as a variation on one of the models suggested in the NSG - Model B in Figure 5.5 of the thesis. The particular guiding principle that determined the nature of the first project was that of pupil choice of material (as suggested by one interpretation of the NSG). The notes attached to the model in the NSG state:

one or more teachers introduce the theme to all the pupils, who then split up. Pupils do their designing and planning in any work area, but make their product in the area appropriate to the material they are using. Each area is staffed by an appropriate specialist (NCC, 1990, p.B13).

This description in the NSG is followed by comments on the implications of the model, relevant ones being:

teacher training needed to widen expertise;

makes use of teachers' specialized knowledge;

enables pupils to choose material and method of working;

pupils may be restricted to working with a single type of material, because of a shortage of accommodation or because many pupils wish to work with the same material;

pupils will need guidance to ensure that they work with the full range of materials during each key stage (NCC, 1990, p.B13).

A rider that I would add to this last point is that some system is going to be required to record what all these pupils have been doing in the various areas.

For the *Entertainment* project in Uppgrove School it had been agreed that, in this instance, pupils would be able to choose the area in which they wanted to work (textiles, food, wood/plastic, metal, IT), although a careful plan of inviting first and second choices enabled the staff to retain control of numbers of pupils with each teacher (addressing one of the issues identified in NSG). Pupils would be based in a "mentor group" which would be whichever group they happened to be in for their last skills input in January. Thus, for example, the group doing their last skill input with Tom would have Tom as mentor for the project. Within the mentor group they would subdivide into two teams of eight (or thereabouts). Each team would then decide on their particular thirteen-week project within the *Entertainment* theme, and four groups of two would then go off to different areas to make something for the team's project. At the end, the pairs would re-assemble in the mentor groups for evaluation. (Figure 6.4 overleaf shows the model for one group of eight pupils).

Each eight-member team would therefore, in theory, produce a project having contributions from the four areas. This plan of action was agreed by the staff involved, although Len observed from the sidelines that it was all rather contrived and typical of the

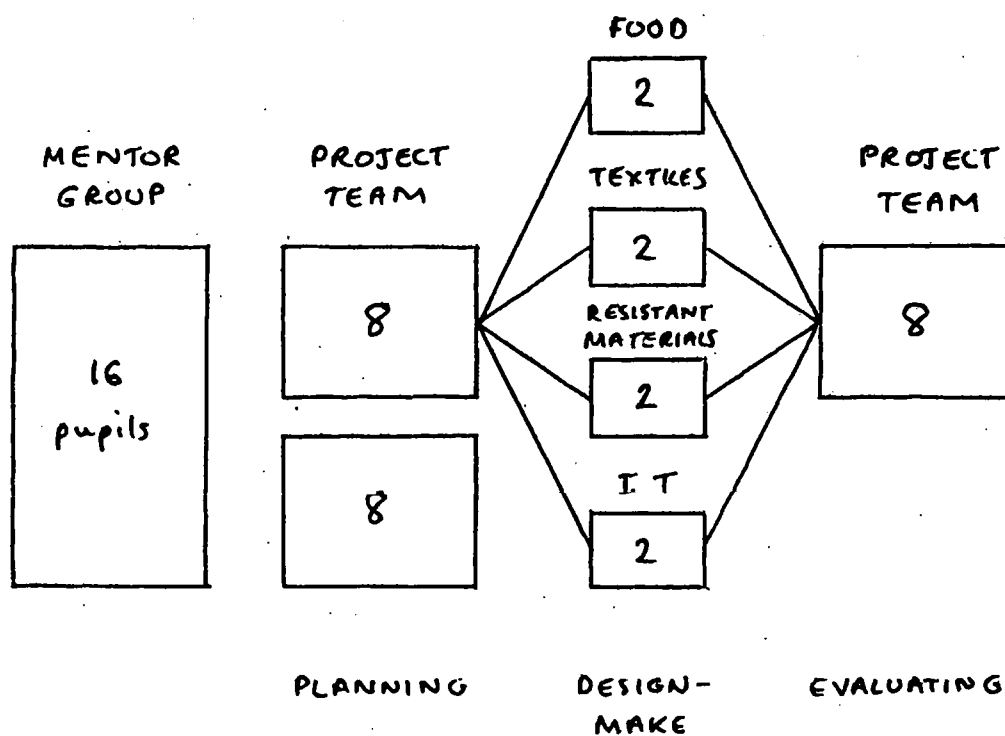


Figure 6.4 The pupil groupings for the *Entertainment* project.

kind of messing about that had replaced serious skill development. It was an interesting if complex approach to a project, intended a) to offer pupils some choice of medium and b) to require them to engage in team work. This approach addressed several of the issues identified in NSG: enabling pupils to work in selected materials but with a specialist teacher. Rather than have one teacher introduce the project (as in the NCC version), each mentor would do this for their own group.

As thoughts turned increasingly towards this stage of the Y7 D&T activity, there was concern within the BS and HE staff in particular about a need they perceived for a teacher to have expertise about unfamiliar materials. This concern was over one aspect of how staff should cooperate as a team in teaching D&T, and it related directly to pedagogy, rather than to organization or administration. The issue is suitably explored by focusing on one person's concern. The question that was particularly exercising Alison at the time concerned her own lack of practitioner knowledge about the work being done in the other skills inputs. Alison's concern was: "How can I advise the pupils in my mentor group on what they might be able to do in areas about which I have little or no expertise?" (R). In the nature of this concern, it is possible to see a parallel between Alison and Phil. Rather like Phil, her concern was in having a complete oversight of the pupil activities for which she *felt* responsible as mentor, and being able to give the correct advice to her pupils. In fact, the mechanics of the project phase of the activity were set up so that pupils were supposed to seek advice from the appropriate *material specialists*, rather than their mentors, although it is apparent even from the model of Figure 6.4 that pupils were likely to need some guidance as to possibilities across the range of materials when they were doing initial planning in the mentor groups. Alison's response illustrates another form of uncertainty that was around, and the anxiety that it led to. This way of arranging pupils' projects did in fact lead to a few situations (out of a very large number) where pupils found that ideas initially approved by their mentor were subsequently discouraged by the subject specialist. Thus, for example, Tom as mentor approved an intention by one group to make sweets. When they brought the idea to Alison, she advised an alternative because of practical and safety constraints relating to their intended product. The pupils appeared

quite amenable to the steer to another product: Tom chose to interpret it as obstructionism. However, that interpretation probably had more to do with the generally fraught circumstances between CDT and HE at the time than with any real problem of a teacher's lack of appropriate knowledge.

Quite apart from the personal circumstances that it put Alison in, the dilemma about how pupils should access specialist information is embedded in the whole question of the nature of D&T as an integrated subject. I have previously noted how the head predicted a ten-year time scale for D&T to become like the science department. Using science as a model, therefore, one is confronted with the same dilemma - the teaching of "science" by one person, even though that person is probably a biologist, chemist or physicist. The question arises as to at what stage it becomes more important for pupils to be taught by specialists who can be effective but relatively narrowly-focused reflective practitioners, rather than being taught by generalists who do not have the thorough grounding in a wider area of practice. It is possible to argue at this stage that the evidence in this school is that the way in which the specialisms within HE were taught by all the staff suggests that an integrated version of technology should be possible, given appropriate initial or in-service training. By comparison with the teaching of CDT in this school, it suggests that for whatever reason, Len and (to some extent Phil) were not able to be flexible enough even within CDT. Perhaps Len's specialism had now become equivalent to that of the pottery teacher in the art department, linking woodwork with expressive arts and leaving D&T to be something else. This puzzle over the nature of integration and the nature of D&T was very much in Alison's mind at this time and she articulated it in much these terms. It relates not only to a teacher's ability to do the job effectively and safely, but also to the integrity of the subject they are attempting to teach. It is an important issue about the nature of the subject to which I shall return in the final chapter.

The single issue that caused most conflict and had the most effect on morale in the curriculum area during this first year of implementation was that of how to assess the pupils' work against the ATs, and it is to this that I now turn.

6.4 The year of the paperchase

Bleak November days

A difference between CDT and HE, which became a "them" and "us" situation, arose from the different ways in which the members of the two departments had constructed their meaning about how D&T should be assessed within the overall national curriculum regime. In this respect there continued to be a different relationship between the CDT teachers and the Order than between the HE teachers and the Order: a difference which needs exploring.

The assessment of coursework (as part of the overall GCSE assessment strategy) had become part of the subject culture of CDT and HE. Therefore there was experience, and some initial meaning structure, brought by both sides to the question of national curriculum assessment. Some individuals' experience was more than simply in-school assessment of projects. Peter had already had several years' experience as a GCSE CDT examination board coursework moderator. Joan and Alison had developed a system of assessment throughout KS3 and KS4 that suited the needs of their GCSE syllabuses. Alison was studying an in-service M.A. course with a focus on assessment. All these people, therefore, brought thought-out but differently-normative perspectives to the interpretation of the requirements for national curriculum assessment.

Regarding external support that these teachers needed when facing such issues, there appeared to be as much variation of advice emanating from l.e.a. advisors as from anywhere else - ranging from "ignore it for the moment" to the provision of detailed schemes of assessment developed by advisory teams.¹⁰ There was no evidence of firm advice from Upgrove School's l.e.a. on the subject of D&T assessment procedures. No-one

¹⁰ The Staffordshire Design and Technology advisory team, for example, produced a set of teacher- and pupil-friendly assessment sheets for recording D&T activities (Branson and Harrison, 1993, provides several examples). By contrast, a senior member of the same authority had previously suggested at an In-set meeting in July 1990 that assessment should not yet be considered a major issue.

appeared to the staff to be able to offer definitive advice, so the staff were again left to find the way ahead by their own lights. The problem in HE was that the stakes appeared extremely high - there was a feeling that as inspection would be a part of the legal process of implementing the curriculum, and with HE still feeling vulnerable in its location within D&T, this led to a desire to demonstrate through assessment evidence that HE was delivering the goods. Here was the coercion of the implementation strategy felt, but with no clear idea of exactly what was needed. The question "Is this it?" was asked as much about assessment as it was about content.

Needing confidence, and needing to work at interpreting the Order, the HE staff were engaged in producing a whole series of (as they saw it) "pupil-friendly" assessment sheets that presented the statements of attainment in terms that they thought the pupils would understand. These sheets were designed to be used regularly during the course of lessons, filled in by pupils and monitored by staff. The underlying intention was a thorough integration of the assessment sheets into the teaching process. Alison had a thoroughly worked out rationale for this, and firmly believed it to be the way that not only D&T but the whole curriculum had to be organized. Some extracts from an interview (taped on 23-11-90) will indicate her point of view.

We [HE] always have thought assessment is something you do as part of the whole learning process and part of the lesson planning. It is possible and I have no doubt that it's possible in technology to look at the end of the whole project to then decide what you're going to look at and to assess but I don't think that's the right way to set about it. I think the children ought to know what the learning objectives are and the staff ought to know what the teaching opportunities are for those learning objectives throughout the whole of the course. [If you don't do this] then I think what you've done is you've missed opportunities that - had you planned carefully - you could have taken to make sure that the children had the opportunity to take part in certain learning experiences. If you don't do this the children's lessons are less enriching than they would be otherwise.

My real world is having eleven-year-olds and sixteen-year-olds and all the ones in between who have to go through a learning and assessment process

with me - one of my jobs is to make it as easy and as obvious and as rewarding for them as I possibly can ... I *do* think the national curriculum is important and I *do* have to assess the national curriculum and I *am* legally required to assess the national curriculum (TS, 23 November 1990).

Alison had been visiting some primary schools and talking with a primary adviser, and felt that this confirmed her own view:

the very first training that they did for the key stage one teachers was teaching and learning styles because they thought the whole thing hung on what they did in the classroom - how they actually assessed the children throughout the whole time that they were there in ways that - it wasn't that the children didn't know they were being assessed, but it was so much part of the learning process that it was just another bit of whatever else was happening. Those are the children that we're going to get eventually. I don't think that we can be developing in a way that's totally different to the primary schools. It's so important that we can't sit back and say well, OK, for the sake of peace we'll allow it to go through - I think there's a real problem that we've come up against (TS, 23 November 1990).

She felt that there was no room for untargeted and unmapped teaching. If the attainment targets were to be "hit" then lessons had to be structured and assessment sheets would provide the evidence. I heard the argument and I saw the outcome worked out in HE lessons. The use of the assessment sheets was integrated into the lesson time, and pupils were moved through the lessons in such a way as to make the whole system work.

Unfortunately the CDT teachers involved were not at all happy with the prospect of the pupils having to fill in all this extra paperwork (as they saw it). Tom and Tony both felt that the paperwork would be an unnatural imposition into the flow of the pupils' work. I spent time in lessons, time listening to both sides of the argument, and asked people about it in interviews. In this instance it was the HE staff who were taking the initiative to which the CDT (and BS) staff had to react. At this stage there was no appropriate informal communications network that could be used for the kinds of conversation that were needed to sort out the problem. The formal meetings were not proving to be an appropriate forum

for resolving issues.

A complicating factor, within the micropolitics of it all, was that it was clear that Peter largely shared the opinion of Tom and Tony, that the proposed assessment sheets were rather in excess of what was required. His view was that retrospective assessment of projects had worked in the past in CDT (provided it was clear to pupils how the assessment was to be carried out) and too much paperwork would distract the pupils from the main task of getting on and enjoying the work. He was also doubtful if the national curriculum would survive in its (then) present form (this was the period following the demise of Margaret Thatcher and there was a whiff of change in the air) and he really didn't want to put a lot of effort into changing the world only to find that it wasn't necessary or that it needed changing again. Unfortunately, this view that concurred with that of Tom and Tony, was interpreted within HE as the formation of a CDT axis against them. I asked in the interview how Alison interpreted the problem:

I think it's partly a power struggle - and I can see clearly that we can very easily range ourselves in departments being against something that we're actually all agreeing with. I think that's really hard and I'm not sure what the answer is - we've actually discussed [in HE] various possibilities with various people. At the minute we haven't got a head of technology - we've got a convenor, which is different. Whether the answer is to have a head of technology I'm not sure ... I thought we were all aiming for the same thing ... I thought what we were aiming for was after these fifteen weeks [of skills inputs] we were going to start *really* addressing the national curriculum and *really* looking at assessment ... I discovered at a recent meeting that that wasn't the case at all. Having thought we'd overcome great problems to all be going in the same direction - we spent an hour in the last meeting not getting anywhere - just going round and round in circles ... I don't know where we go after that meeting (TR, 23 November 1993).

Impasse

As if to compound the problem and at what seemed the worst possible moment, the CDT area adjacent to the HE area was taken out of commission for refurbishing. This was part

of a rolling programme of refurbishment within the county, designed to bring former woodwork and metalwork facilities into the D&T age. It was just what was needed from the point of view of D&T facilities in the long term, it also included a plan to do away with the existing CDT-art staffroom and replace it with a larger and slightly more central area that would accommodate BS, CDT and HE staff within the same four walls. This latter feature was not least a decision on the head's part to do something physically about getting the curriculum area together.¹¹ However, whereas the refurbishment was within the l.e.a. budget, the staff area was intended by the head as a self-help project. Losing a double teaching area at this time of year was difficult in terms of the teaching of CDT, but in terms of the process of implementing D&T it served physically to isolate the HE staff. The only way into their new accommodation was through the fire door to the outside. The chances of informal contact between CDT and HE staff were, therefore, significantly reduced.

Once the Y7 13-week project got underway, the HE-originated assessment sheets were introduced. The CDT teachers in particular became less and less enamoured of the assessment paperwork. They were not convinced of the need for it, and, consequently, did not build the use of the sheets into their lesson structures. Consequently, the sheets got overlooked or rushed, the system didn't work, became a source of annoyance, and generally got into a vicious circle of self-fulfilling prophecy. Both sides were equally despairing. There was a major issue to be resolved here, and it is possible to suggest that the absence of a member of the senior management team from involvement with the curriculum area did little to help resolve the issue. There was no-one to arbitrate.

The series of events that led up to this situation shows interesting parallels with Paechter's (1993) report on conflict and cooperation in cross-curricular coursework. Here, she

¹¹ He was aware of the general difficulties of communication within the D&T curriculum area, if not of the exact nature of the present difficulty. He did have an overall long-term intention to move the three departments gradually into closer physical contact, as circumstances allowed.

identified a very similar basis for conflict as teachers from different "subject subcultures" (as she calls them) tried to reach consensus on the marking of pieces of coursework. What emerges is that the procedures and understandings of assessment, especially in practical work, become firmly embedded in the culture of the subject - part of the constructed meaning of the subject and, therefore, tending to tacit knowledge. Of course, the whole point about tightening up on assessment procedures is to try to be more objective. The HE approach was to take this at face value and adopt an "if it moves, assess it" approach. CDT, however, were wanting to carry on with a retrospective "well, it looks like a "B" to me" kind of assessment, going back over the available evidence at the end of a project in the light of knowledge of the way the pupils had worked. The problem in the school was that the two approaches clashed head on.

There was no easy resolution of the problem. There needed to be negotiation between Peter and Joan (BS rather viewed the storm from a safe distance) but this proved impossible. In the middle of all this struggle, plans had to be developed for the next project. It was decided that this would be within a *Leisure* theme and that pupils would work individually in one area. Regarding assessment, it was believed in CDT that it had been decided that this second project would be assessed retrospectively in a less-structured way. Unfortunately, this interpretation was not shared by Joan and Alison who felt that the entire programme had been subverted, and that Peter had simply reverted to acting as head of CDT. In the end, the HE staff reluctantly took the problem to the head, who agreed to attend the next curriculum area meeting.

That meeting (which I attended) simply brought a refusal by some staff to deliver the necessary assessment sheets. At the time it felt like an all-time low in morale, especially for HE. In retrospect, it was a turning point, because the problem was no longer contained within the curriculum area and arbitration became possible. The head organized some meetings out of school between the heads of department where he and other senior staff performed an arbitration and conciliation function. In the short term, HE and CDT ended up using their own assessment methods. In the longer term, it caused the head to look very

carefully at the issue of the management structure of the curriculum area. Peter's two-year convenorship was nearing its end, and a decision had to be made about how to proceed.

6.5 Decisions at school level

Reviewing the curriculum area management structure

The difficulties over assessment procedures highlighted that fact that the combination of a convenorship combined with the absence of a member of the senior management team to arbitrate was hindering progress. Within the curriculum area, centrifugal forces directing people back to their departmental colleagues were still greater on the whole than centripetal forces drawing them together. The curriculum area was still very much hybrid, in transition and storming. The physical moving together of the CDT and HE areas had not promoted a significant increase in the informal contact, although that had latterly been due to the refurbishment closure.

The two-year period of the convenorship was coming to an end, and the head decided that two permanent posts of responsibility would be advertised internally: i) Head of Technology and ii) Coordinator for Key Stage Three. The following extracts are taken from the sheets issued by the head in July 1991 (italics and emphases as printed).

The job description for Head of Technology stated that

The most important aspect of the role of Head of Technology in the near future is to unite Business Studies, CDT and Home Economics into a Technology Department able to meet the requirements of the National Curriculum Technology document (School document, July 1991).

The job description for Course Coordinator for Key Stage 3 stated that

A priority for the Course Coordinator will be to work closely with the Head of Technology, and with others with specific subject responsibilities within the Department, to unite Business Studies, CDT and Home Economics into a single Department able to sustain the high standards of teaching and

learning currently set by those Departments individually (School document, 1991).

A further sheet was issued simultaneously, headed *Head of Department: Business Studies, CDT and Home Economics (within Technology)*, and stated

It may be convenient to refer to the Head of Department as the teacher *Responsible for Business Studies*, etc to avoid confusion with the *Head of Technology* (School document, July 1991).

The covering letter that accompanied all three job descriptions stated that

This arrangement is felt to be the best way of acknowledging the reality of the situation, which is that Departmental boundaries have been removed at Key Stage Three but, for the *next two years* at least, will remain for GCSE courses, and for the *foreseeable future*, for Sixth Form Courses ... This apparently complex solution gives us the flexibility to cope with planned changes in the school over the next five years; gives a clear statement that Key Stage 3 is now Technology (and all members of the existing CDT/Home Economics/Business Studies Departments are part of the Key Stage 3 team); and allows coherent planning of Key Stage 4 (School document, July 1991).

This setting out a vision for the medium-term future of the Technology Department provides one view of its continuing hybrid and transitional character. There had been an expectation within the curriculum area that the various appointments would be made by the end of the year. For a variety of reasons they weren't, so a degree of uncertainty in this respect remained into the early part of the following school year. There seemed little doubt that Peter and Joan would be the only candidates respectively for the jobs of Head of Technology and Course Coordinator for Key Stage 3. Alison had obtained a deputy headship in another school, and would be leaving at the end of the year.

The role of BS

It will be clear by now that the contribution from BS to the implementation of D&T in this

school year consisted mainly of staffing two Y7 timetable slots. Eleanor and Kay were engaging with the need to teach in this new environment, and were both doing their best to contribute what was expected (Peter observing that his earlier concerns in this respect had been somewhat allayed). But, whereas CDT and HE were making sure that the pupils experienced as much as possible of what they considered to be valuable from the *already existing* stock of valuable Y7 activities, BS were having to create or adapt from other age groups material for the Y7 pupils that they were teaching for the first time. And, whereas HE were certain that their future lay *only within D&T*, the attitude in BS was still that D&T was something they were required to contribute to, although they actually had a role *as BS in their own right*. The surge of interest in the BS GCSE courses (the opposite side of the coin that had caused the sudden decline in the fortunes of HE), and the continued existence of their vocational courses in Y12 gave BS a sense of security that had long deserted HE. However, neither Peter nor Joan nor Sylvia were convinced that the contribution of BS had been sorted out.

The evidence from the skills inputs was that whereas BS could contribute well to AT5 (IT), it was not likely to be a great contributor to AT's 1-4 (D&T). That is the way it had continued through the project, with BS generally providing the word-processing and other facilities that pupils wanted to use as a part of a wider project. More significantly perhaps, the head was also considering the place of AT5 across the whole curriculum (which is how it was envisaged nationally that it would be taught) and this had independently drawn his attention to the need to clarify the relationship between the cross-curricular IT AT5 and the "subject" D&T ATs 1-4. In particular, the head was not sure at this stage if responsibility for cross-curricular AT5 should rest with the BS staff or elsewhere. Historically, responsibility for computer networks and for computer studies had grown up in an untidy way in this school as in many others. Although the coordination of IT had been identified as already someone's responsibility in the April 1989 booklet, what was happening in practice was that pupil access to computers was that person's main responsibility, and technology AT5 was not really being addressed across the curriculum. So the time was now ripe for a rationalization.

The head had also decided a further feature of his plan to strengthen the physical ties within the D&T curriculum area. Rather as in the case of the relocation of HE, there was not a single motive, but on this occasion he had decided that he would relocate the BS computer network to a room nearer the CDT block. This, combined with his plan for a new, enlarged and combined staff area as part of the CDT refurbishment, was intended to do something about the proximity of the BS staff and the rest - finally bringing all three areas into communication distance and reinforcing the territorial identity of the emerging technology department.

The outcome of the review of the place of AT5 was that, when the D&T curriculum area management structure was re-assessed and jobs advertised internally for the new Technology Department, the post of AT5 coordinator was also created and subsequently awarded to Eleanor. The covering letter with the Technology job descriptions of July 1991 stated that

Eleanor ... will be responsible for AT5 - Information Technology. She will be responsible for working with all colleagues across the school; for planning schemes of work and for the assessment, recording and reporting of this attainment target (School document, July 1991).

The proposed Technology Department could, therefore, rightly be described as such, for within it would be those responsible for planning and teaching ATs 1-4 as the subject D&T, and also the one responsible for coordinating the cross curricular AT5, Information Technology.

The nomothetic perspective on this school as an organization does show that structural changes were taking place that would underpin the formation of a subject department in technology. Posts of responsibility were being identified and job specifications were being tightened up. Steps were being taken to mould the facilities into a unitary whole. The idiographic perspective shows how individual concerns and agendas were operating all the time as teachers tried to make sense of the new requirements by bringing the only meaning they could from their existing subjects.

6.6 Norming?

Despite all the interactions going on within and between the departments, the everyday job of teaching pupils was going on as always. The outcomes that the pupils were generating were generally of a quality consistent with that obtained in the comparable former activities in Y7, although there did seem to be an increasing amount of paperwork being gathered in folders that had to follow the pupils from one activity to the next.¹²

Half a training day had been set aside towards the end of the year for the purpose of internally moderating the standards that the various Y7 teachers were expecting for pupils' work to be allocated to a national curriculum level of attainment. To do this moderation, pairs of teachers were required independently to assess the level of a given project on the basis of the evidence of the pupil's folder and artefact. It actually made people talk to each other, and gave them something concrete to focus on, and apply their various assessment skills to. Tom reported a useful interaction with Alison, where they had been able to agree on levels for various pieces of work. Tom said that he was tempted to say "told you so" (S), feeling that his retrospective assessment was, therefore, validated, but was in a noticeably more mellow frame of mind on the subject than of late.

By the end of the school year the management structure of the curriculum area was about to be rationalized, and the relationship with AT5 and with BS was being clarified. The remodelled CDT accommodation was in use and access between this and HE was again open. Alison left for her new job and Len settled down to having a summer break away from it all. Joan looked forward to a holiday to make up for last year's room-fitting activity - it being Peter's turn to come in over the holiday to finalize the fitting-out of the CDT area to his satisfaction. And there was the prospect that the new staffroom (for which chairs had arrived, if not any further progress made), and the newly-relocated BS network would

¹² Peter's stated intention for the next school year was that, having got the organization of the teaching of D&T more or less right (skills inputs followed by a project), the focus should be on improving the outcomes achieved by pupils.

finally make it possible for the curriculum area to move closer together and to be able to hold more informal negotiations. Also, the nature of D&T was beginning to become a known quantity (it was felt) and there was more confidence that what had been taught in Y7 was as appropriate as that in many schools. Peter had used his visits to other schools as a GCSE moderator to glean information about how other schools were tackling D&T. Joan and Alison had used informal links with staff in other schools to reassure themselves. A visiting inspector had been generally encouraging, and had suggested that assessment needed perhaps to be rather more light-handed than was the case in HE. The end of the 1990-91 school year seemed very much like a ruling-off at the end of a very well-used page.

7 D&T through KS3: September 1991 to December 1992

7.1 Introduction

This period of time includes the whole of the second year, and the first term of the third year, of implementation of D&T. Several factors combine to make this a convenient period to consider as a whole. By December 1992, the nature of D&T in KS3 of Upgrove School was becoming established and most of the curriculum area staff were contributing to its teaching. The management structure and responsibilities in what had become the Technology Department were becoming clearer and the first cohort of pupils experiencing D&T were approaching their KS3 assessment tasks in Y9. D&T (as specified in the 1990 Order) had completed its entry into the whole of KS3, having entirely displaced the preceding separate subjects of BS, CDT and HE. The exact requirements for Key Stage 4 under the 1990 Order were formally revealed in January 1993 (SEAC, 1993), and that would be the next major stimulus to decision-making, marking the arrival of a new set of issues to be addressed. Just as D&T was getting to the point where some normative meanings were being constructed, however, a national review was announced. It was clear from proposals for the revised technology Order (DFE/WO, 1992) that the review would be changing the form of the subject quite considerably, bringing about another round of changes to be responded to in KS3 from September 1994 onwards (Figure 7.1)

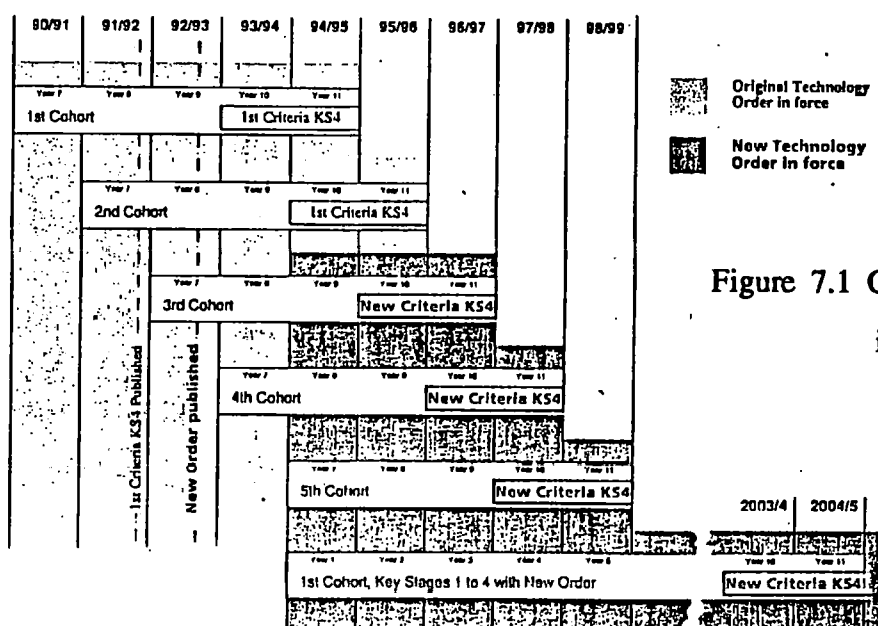


Figure 7.1 Chart of proposed D&T implementation

In this chapter, the case study is taken up in September 1991, when Y8 pupils were starting their second year of D&T and a new cohort of Y7 pupils were about to begin. I do not propose recounting in any detail the teaching of D&T in this period, because it evolved along the lines already indicated in Chapter 6 for Y7 in 1990-91. I shall outline the way the implementation had moved in terms of pupil activities and shall then consider how a series of issues, raised in previous chapters, developed. The issues pursued are the mechanisms for formal and informal negotiation, and the consequent opportunities for construction of new meanings; the development of new assessment procedures; the staffing of D&T particularly from the CDT area; the role of BS within D&T; and the particular issue of the use of themes as a way of organizing the teaching of D&T.

7.2 September-December 1991: inexorable progress and thwarted intentions

The progress of D&T through the school years required new issues to be faced and presented new problems to be solved each year. Its progress provided a mechanism whereby the coercion of the change strategy arising from the legal force of the technology Order actually transferred itself into the school. However, as will be seen, school-level strategies that did not depend on coercion, and that were not so inexorably driven, proved to be capable of thwarting by people or events.

By September 1991 the first phase of CDT refurbishment was complete and the existing BS network had been moved to its new room adjacent to the CDT area and Eleanor had moved her teaching base with it. However, Sylvia was still based in the other BS room, so Eleanor and Sylvia were likely to find their successful but informal in-department communication link more difficult to sustain. Unfortunately, the new combined staff area (which required a room partition built on a do-it-yourself basis), intended by the head to facilitate the informal communication network of the curriculum area, had not been established. On the first day of the new term Len was to be found at break occupying his usual seat in its usual position in the original CDT-art staffroom which still retained its original clientele. It turned out that there had been some difficulty over fire regulations and the arm-chairs cascaded from the main staffroom were still neatly stacked up at one end of

the space allocated for the staff area. The pattern of staff contact remained essentially as it had been. The CDT-art-staffroom still could not accommodate extra bodies. Therefore, although Eleanor now had her teaching base closer to the rest of the D&T accommodation, her social base remained in the main staffroom. At this stage Len was fairly clear that he had no intention of moving out anyway, and he observed that Phil seemed to be spending increasing amounts of his time in his own room or in the examinations office. Phil certainly seemed to think that he was busier than ever trying to prepare material for the new D&T course and adding increasing numbers of KS3 SATs to the list of things to be done wearing his examination officer hat.

The HE staff had for some time been in two minds about the proposed new staff area. Although they were sure that a combined staff area would help the process of informal communications, they felt that they needed an office space within their new rooms so that they could be in close proximity to the pupils who invariably occupied their area through lunch times. The HE staff tended to have their breaktime brew on the hoof in their teaching area. Alison's timetable had been taken over by a new full-time HE teacher, Sharon¹, and Barbara remained in her part-time post. The need to continue working at the applications of HE within D&T, and to introduce the new member of staff to the way of doing things in the school, kept the HE staff focused on their own department and in their own area. So there was little motivation or time at this stage to get the new staff area into operation, and some doubt that, if it were set up, it would get used in the way that the head hoped. Although it was fire regulations that actually stopped it being created, there seemed some doubt that the motivation and time available to do the work needed was sufficient at this stage. At least now the physical separation (caused by the refurbishment of part of the CDT accommodation) between the HE area and CDT had been removed, and the HE staff walked through the CDT area on their way to and from their own area and the main building of the school. However, time, tide and the timetable driven by statutory Order

¹ A Home Economics teacher who had moved into the area and who was returning to full-time teaching.

wait for no-one. The need now to teach D&T to Y7 and Y8 meant that the previous year's juggling of the CDT timetable slots could no longer keep it to those who really wanted to teach it or were considered most suitable to teach it. Len and Phil both found themselves having to contribute to D&T, which meant that their responses would now be from a position of necessary involvement rather than observations from a position of anticipated involvement.

The pattern evolved for the first run through Y7 in 1990-91 had been considered to be generally successful. The most significant change in the organization of pupils' projects was that the complex arrangements for pupil choice in the first Y7 project had been reviewed and were now considered to be more trouble than they were worth. Increasing confidence in constructing a working version of D&T (confidence built on exchanging information with colleagues in other schools), and a wish to improve the control by individual staff over the quality of pupils' work (which was a concern of many more than Phil, and had become the focus of Peter's intentions for the year), meant that pupils would carry out projects in whole teaching groups. The intention would be for pupils to sample a range of materials as they progressed through KS3. Inevitably with this arrangement, if staff were allowed to contribute their own activities (as was the case in CDT), pupils would not all experience the same activities. In terms of the models offered in NSG, the pupils were to experience a series of "B"-type projects (as in Figure 5.5), which would mean that their progress would need careful tracking and coordinating. This promised to be a task complicated by the residual lack of agreement over assessment.

The use of themes

I noted previously how themes had become the normative way in which the input from various departments could be incorporated into the teaching of D&T. Each theme comprised an initial skills circus followed by a project: the skills being selected from those conventionally associated with the materials used in CDT and HE, and the software of BS, gradually developing through KS3 the range of skills available to the pupils. Themes were

intended in this school to be the means whereby the specialist subject areas could coordinate their contributions of skills and knowledge within the framework of programmes of study, working towards statements of attainment. Possibly the strongest use of a theme was in the very first 1990 Y7 activity when groups of eight pupils took responsibility for planning a project within the *Entertainment* theme and then split into four pairs to work in different materials and then came back together (Figure 6.4). Here, there was considerable initial discussion of the nature of the project within the groups of eight and it was apparent in some instances that the pairs of pupils *did* make coordinated contributions in different materials within a whole project. The same was not necessarily the case when the theme was simply an umbrella term within which departments (and, in the case of CDT, individual staff) could suggest not only a skills input but also a project. The evidence from the case study is that themes varied in their suitability for the organization of *skills inputs* in D&T, as the following examples will illustrate.

The first theme for the 1991 Y7 pupils took inspiration from the fact that the school was holding a book week. It was possible to see how most of the initial skills inputs at least drew inspiration from the theme: bookends in wood, an aluminium bookmark, a cloth book cover, a book label designed in IT - the problem area here was food. This begins to reveal the weakness of themes if every one is expected to generate a valid activity in all the areas, given the wish of all areas to protect the inclusion of their content. The purpose of the five national curriculum *contexts*, within which the themes were located, was to ensure a *breadth* of subject matter - implying that different contexts would force the issue of using different materials and approaches. Attempting to use themes in such a way that justice is done to each area in each case is rather a different purpose, and appears to result sometimes in a rather tenuous rationale.

The initial theme chosen for Y8 in 1991 was *Energy*. As had been the practice in the past, the CDT teachers tended to work out their own skills inputs within the theme and check them out informally with Peter, whereas the HE teachers tended to come to a corporate decision. I happened to be in the CDT-art staffroom when Len was confronted with the

outline teaching requirement of this theme. He said, rather sadly, "There is nothing that I can contribute to this" (S). It wasn't said with the usual bantering anger, but came across as a heartfelt comment on the gap that had opened up between what was required and what he could offer. However, Len was far too experienced a campaigner to indulge in too much self-pity for too long. When I asked him later what his pupils were doing within the *Energy* theme, he replied "making pencil boxes" (R) ... "And, before you ask, no - it has nothing to do with energy, but it's what I can do with them" (S). Phil had also had to decide what skills could be contributed within this theme from his graphics expertise. In the early days of thinking about it he sounded quite enthusiastic about re-vamping one of the exercises he had been using with pupils for several years - "It's about time I re-invented it" (S). However, as the term developed it became apparent that he was finding the ever more limited time available to him increasingly irksome. When asked how the activity was going, the reply was quite simple: "awful - they do some letters and some printing and an exercise in colour techniques: three marks and that's it" (R). This led also to some comments from him about the quality of graphics work that was being produced by pupils who came to him who were "supposed to have done graphics with someone else" (S). He felt reinforced in his view that his control over pupils' progress was being eroded, leading to a drop in the standards of pupils' work and further frustration with the way the situation was affecting his ability to do his job in the way he believed it should be done. Also, whereas he could find something appropriate for the skills input, he was much less certain about the expected nature of his contribution to the project phase of the theme.

Apart from such overt subversiveness as Len's pencil boxes, there did seem to be quite a tenuous link between some of the skills inputs and the *Energy* theme, raising the question as to whether there was any purpose in having the theme at all. The textiles activity was to make quilted pictures based on energy-related logos or motifs. The intention was to develop techniques of quilting and the outcomes were of good quality and made a very attractive display. But it was quite clear that it was the quilting skills that were the desired learning objectives and they were likely to have been a desired set of skills to be learned whatever the theme. Tony's groups were engaged in using a modular electronics kit to

learn about a range of input and output devices. The justification was that it was about the control of energy. Again, the decision seemed to have been that this was an area of knowledge that it was felt desirable to teach, the equipment was available, so it was included in the theme with rather minimal justification. Tony himself observed, when he had had rather more experience of teaching the various skills inputs and subsequent projects that he was "getting a bit fed up with themes" (S). When asked why, the answer was that he would prefer to be able to develop a rather more consistent approach for a rather longer time - tending to the kind of argument that Phil or even Len would use. Therefore it appears that Tony, who was new to teaching when D&T arrived, was beginning to feel the lack of a "subject" in KS3. Themes seemed to be showing a distinct weakness as organizers for teaching by comparison with the earlier subject that they replaced, but the lack of a philosophy of the nature of D&T meant that there did not seem to be an alternative at this stage.

NCC In-set material for D&T (NCC, 1991a, 1991b, 1991c) became available in 1991. By this time schools had had to make decisions about many of the issues addressed in the material, and it was felt generally in Upgrove School that it was rather late on the scene. It did not get used in any significant way in negotiation between departments. However, its self-stated intention was:

to extend teachers' understanding by explaining the programmes of study and attainment targets by addressing the issue of progression in D&T capability, and by providing a means of developing themes and topics for D&T (NCC, 1991a, p.2).

It did confirm, therefore, that themes were what was expected, and the material provides the NCC view of the nature and use of themes. The following extracts are from NCC 1991b, Sections 10 to 13 (emphases as printed). They are supported by the diagrams shown in Figure 7.2 (overleaf). It is important to realize that, within the NCC's implementation strategy, this material was intended as a primary means of clarifying with

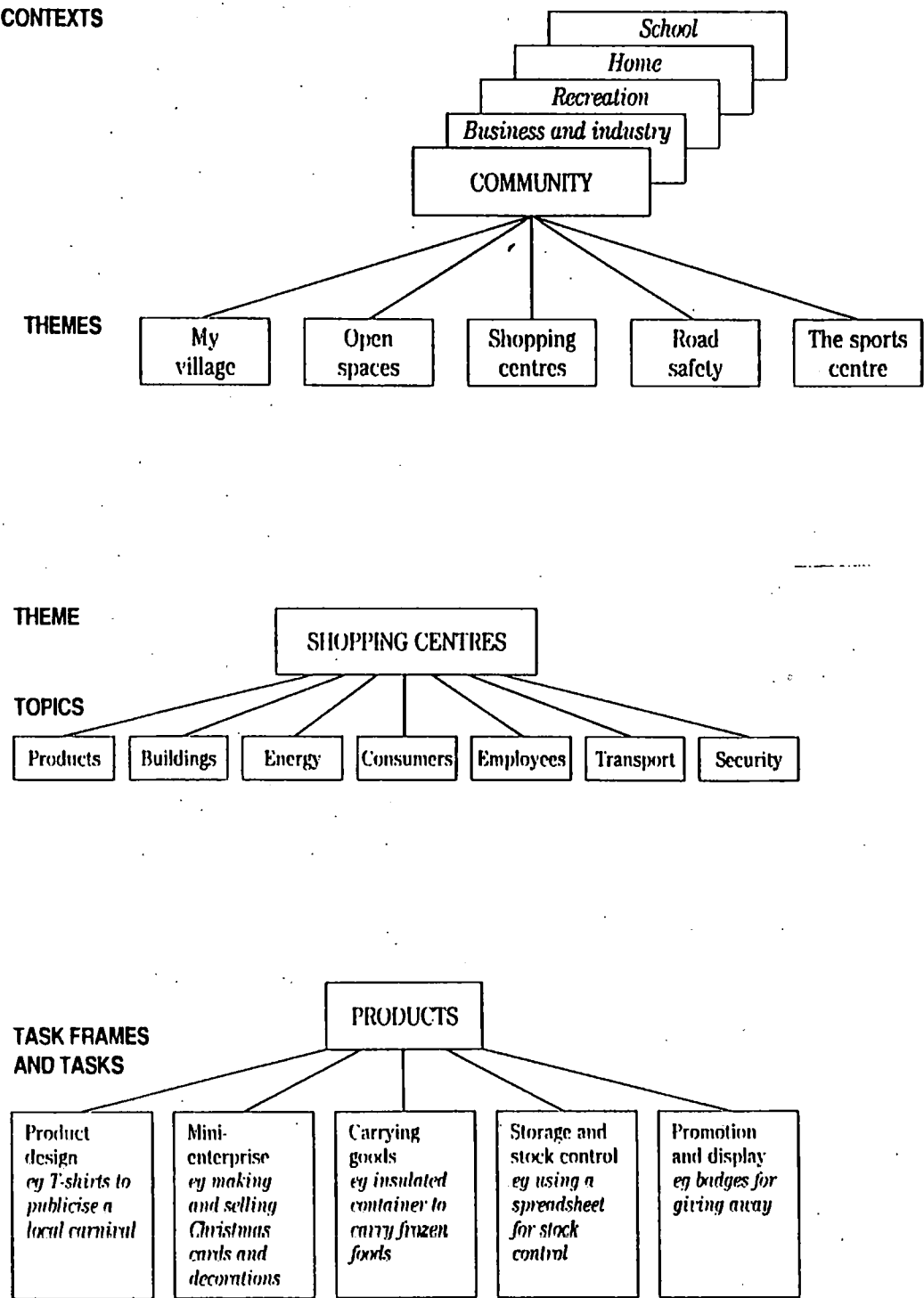


Figure 7.2 Diagrams from Non-Statutory Guidance illustrating the use of themes.

teachers issues of D&T implementation.

Contexts are situations in which D&T activity takes place ... Contexts provide starting points for developing work in D&T and ensure that social environmental, economic and moral issues are considered. Themes are developed by the teaching team to provide a more focused stimulus for activity. **Themes** can be designed to address individual contexts, but they may also span several contexts.

Topics are subdivisions of themes which identify areas of investigation. They are important to planning because they identify knowledge and skills, and enable teachers to determine the resources needed to support pupils' learning. Topics may be chosen by the teacher to develop particular skills and knowledge, or may be identified by pupils.

Tasks are the activities which pupils undertake to satisfy the needs they have identified ... Topics give rise to a variety of *task frames*, which are the basis from which tasks develop, eg the topic of Security might give rise to task frames of Premises, Packaging and Money. Task frames help to focus pupils' attention on tasks, whilst enabling them to make decisions about the particular tasks to be undertaken.

The themes chosen for a key stage should provide a balanced range of contexts ...

There are many starting points for themes, including the following:

pupils' interests ... school events ... community needs ... the environment ... local industry ... global concerns.

Every D&T activity should focus on practical purposes and processes ... it is important for the D&T teaching team to establish its own criteria for evaluating topics ... (NCC, 1991b)

There is reference here to contexts, themes, issues, activity, areas of investigation, topics, tasks and task frames before one gets anywhere near practical problems, processes, skills and knowledge. As an attempt clearly to communicate the nature of a D&T *theme*, the material seems to introduce an excessive number of additional concepts whilst avoiding getting to grips with what makes a theme characteristic of D&T. The material goes on to

give an example of the use of a theme:

In one school, pupils worked on the theme of *The Theatre*. They decided to design and make a model theatre and to perform a play, and used a wide range of materials and media, to produce a variety of outcomes.

they used graphic media to produce promotional material, including posters and programmes, scenery, backcloths and props;

they used textile materials to make curtains, and clothing for model characters;

they used construction materials to create the stage and design set, animated characters, control and lighting system;

they used computer-aided techniques for scenery design; desk-top publishing for tickets, programmes and posters; computer control for the curtains and lighting (NCC, 1991b).

Judging by that example, Upgrove School had it just right in their first *Entertainment* project, but subsequently lost the feature that pupils worked in different media within teams working on a project within the overall theme. At a more local level of advice, the l.e.a. document observed that:

A large majority of schools are using common contexts or themes which are initially introduced to the whole year or half year block. This is followed by group work with a teacher on a topic or problem associated with the context, usually within a specific media area e.g. art and design, CDT, Textiles, etc. (L.e.a. document, 1991).

Whereas the model first used in Upgrove School appeared to be of the approved kind, it proved too unwieldy from the point of view of controlling and coordinating pupils' work. Martin and Coleman (1991) discovered in their national survey that most primary and secondary schools in their sample were using topics or themes for work in D&T. Their comment was that:

It was noticeable that there was greater variety and clarity of purpose in the primary topics. In secondary very broad themes were widespread - Our School, Entertainment, Communications, Christmas and Survival were typical and widespread. We suspect that these broad "themes" were often a way of superficially integrating contributing areas without a clear perception of the purpose of the theme. (Martin & Coleman 1991, p.140).

Their observation that themes were used more effectively in primary schools is an interesting reflection, suggesting the possibility that in the primary phase, teachers were well used to using themes for coordinating work in many subject areas, whereas the different mechanism of coordinating between individual departments in the secondary phase was not working to such good effect, especially in the absence of clearer guidance about what constituted a D&T theme. This latter was certainly the case in Upgrove School, where the use of themes was a pragmatic solution allowing skills associated with previous subjects to be taught largely without construction of meaning for any broader view of the nature of design or technology beyond the Order.

Working as a technology department

The purpose here is to follow up several aspects of the transitional nature of the Technology department (as it became). The issue of assessment moved towards a resolution, as did that of management within the department. The problem of the use of meetings in particular and communications in general remained.

It took until after the October half-term break of 1991 for the people to be appointed to the two new posts of responsibility in the department. Following the internal advertising, it had been decided that a formal interviewing process had to be undertaken, and this took time to set up. However, Peter was duly appointed as Head of Technology and Joan as Coordinator for KS3 - there being no other applicants. Responsibility for BS, CDT and HE remained respectively with Sylvia, Peter and Joan under the conditions and job descriptions as made available the previous July. The outcomes were generally expected and accepted. Nobody wanted to challenge the "obvious" candidates for either of the jobs.

At the very least, it clarified the relationship between Peter and Joan and resolved Peter's uneasy position as convenor. It emerged later that Peter had felt a potential threat when he was convenor because Joan's vigorous engagement with D&T might have suggested that she wanted the job of head of technology. At least the sorting out of the management structure removed that source of concern.

Joan gradually evolved a system of accumulating information about what pupils had done. It depended on everyone cooperating in handing her the information, and *some* (she said with a sigh) were still not doing that, which made life a bit difficult. I asked if she felt pressure to have these records complete: "Yes" was the very firm answer. It emerged that she now felt, being head of KS3, that the buck stopped with her if anyone came to look at the information about any aspect of KS3 assessment (rather than just the HE part as it was previously). On being asked who may want this, it was a rather vague "inspectors". But here was a person feeling the coercion of the strategy applied at national level to the implementation of D&T. As the person given the responsibility, she felt trapped between someone "out there" wanting information that some "in here" were reluctant to give her. So she was finding herself in this respect having to be the agent of coercion in the school - and consequently a victim of that coercion.

Despite Joan's concerns about gathering information, the assessment issue generally had calmed down somewhat. As previously noted, a visiting inspector had suggested that the quantity of assessment information could perhaps be rather less than the HE teachers had envisaged. Provided appropriate information was supplied to Joan at the end of each project, she was no longer pressing for the development of worksheets with integrated assessment from those who didn't want to do it that way. Peter continued with the view that the pupils in KS3 should not be overwhelmed with paperwork relating to assessment procedures. Phil, now teaching D&T in Y8 and consequently having to report assessments to Joan, was in agreement with what had become the CDT line about the intrusiveness of assessment. Interestingly, however, for Phil a "full mark book" was of the essence of keeping in control of the situation. However, he did not see a mark out of ten and a

comment given on completion of a drawing exercise as being in any way comparable with the (in his opinion) overambitious assessment against D&T ATs. Another factor was that a mark book was entirely personal to him - having to report regularly to someone else using that other person's system (as he saw it) was perhaps rather more irksome.

In terms of working together as a department, one of the main problems continued to be that of communication. The schedule of meetings was generally felt by staff to be calming down, perhaps as staff realized that the head was quite serious about meetings having to happen only if they needed to (although there remained a difference between the head's perception of "need" and that of some staff: Tom, for example, still seeing little need for any meetings). One of the continuing problems of curriculum area meetings linked with the general one of communication, in that it continued to be difficult getting people together at the right time and with the right information. Getting them also to take away and act on information was difficult in some cases. Joan, now feeling the pressure of being in charge of KS3, found it a source of some despair at times. The formal structures and mechanisms were all in place. The meetings were scheduled at the beginning of the year and were printed on the main timetable. Agendas were circulated in advance, as was some information. Other papers were tabled. But always a few people would turn up without papers, some would arrive late, some would have to go early if not on the dot of the finishing time. Either by intention or by default, it remained easy for the meetings to be subverted. However, as time moved on, there were some useful discussions in which negotiation did take place. The following description presents evidence from one typical meeting of KS3 D&T staff, held in December 1991.

Like all such meetings, the starting and finishing time and venue were clearly identified (meetings had been happening regularly for over two years by now). Joan (as head of KS3 D&T) chaired the meeting, which was held after school in the HE area, so she was there at the designated starting time. Len arrived on the dot, carrying a file which turned out to contain the necessary documentation. Peter arrived shortly after the official starting time, then Tony, then Tom, by which time about five minutes had elapsed. At this stage Len's

body language finally gave way to a direct question "when does this meeting start?". This brought an apology from Tom, who had been briefly to another meeting, and a decision by Joan to start the meeting. Subsequently Eleanor and Sharon arrived, which completed the quorum for this meeting. On this occasion Tom, Eleanor and Tony brought no paperwork with them. There were no minutes from a previous meeting. There was some discussion of the need to pass assessment information to Joan, who was still trying to obtain information from some staff from previous activities. The project stage of the Y8 *Energy* theme was discussed in some detail, and Joan suggested that the staff involved should agree on a common "hit list" of programmes of study no matter what area the pupils were working in. This provoked something of a negative response from Tom but the discussion staggered on in a rather desultory fashion, taking in the form of a possible common booklet to guide pupils through the project. Here Joan was continuing to try to tighten up on procedures that Tom in particular wanted to keep fairly loose.² Joan drew attention to the existence of an electricity safety video, which people would have to book for use. This provoked discussion about the possibility of introducing pupils to the task of correctly wiring up a mains plug. This roused Len into a vigorous rejection of this possibility "kids with wires trailing from mains plugs - no chance!". After this there seemed a general reluctance to pursue the idea, and Peter thought that it was done in science anyway, but would check. Another item for inclusion in this project was a costing sheet for whatever materials the pupils wanted to use - this being a new inclusion for Y8 pupils as part of their progression. Joan tabled copies of a sheet which she had prepared, which prompted Peter to go and get a version he had prepared (they had both agreed to draft one, but had not had time to confer before the meeting). It was agreed that the two of them should evolve a single version from the two drafts. At no stage was Eleanor (of BS) asked to be involved in the production of this sheet, and she did not offer any comments. The final item of discussion about the *Energy* theme related to the pupils' concluding evaluative presentation to the parallel groups of pupils. Joan suggested getting all the pupils together in the hall with

² I confirmed that this was the case through subsequent conversation with Tom.

their products, giving brief presentations to the other groups. The mechanics of this were questioned and Joan suggested the use of the school's radio microphone. Len snorted, grimaced and shook his head. However, the idea was approved and Len said to Joan "You just tell me when you want me to bring my kids to the hall and I'll do it".

The next item for discussion was the Y9 mini-enterprise activity, but time was up and the meeting was breaking up. Len left saying "Well, I'm off", Tom followed his lead saying he had to catch his lift home, and it was apparent that no further discussion of the agenda would be taking place. However, enough had been said about the enterprise activity to catch Tony's interest and he, Joan and Peter stayed for another half hour talking about various issues, but in particular the difference between one-off, batch- and mass-production. It was an interesting discussion about an important issue in technology education, and touched on the place of craft skills "such as Len wants to teach" (Tony, S). Tony observed that much of what the pupils do is prototyping, and there was the basis here for discussion of some interesting points of pedagogy. The discussion was left rather up in the air, but some interesting points had been aired between these few people across the subject departments.

This meeting was quite typical. The business was carried out within severe constraints of time and with several people making off-the-cuff contributions having not brought circulated papers. However, this was not the only occasion on which discussion continued informally afterwards when issues of the nature of D&T and its pedagogy were raised. Useful negotiation did sometimes occur during meetings, although the information was often not recorded. For example, a meeting in November 1991 included a conversation on the nature of "design briefs". It focused on the degree of constraint that should be used, and the conversation made reference to examples of pupils' work, as well as being directed at the nature of briefs used at various stages in projects. This kind of issue, taking in the nature of technological design and a pedagogy for teaching it, was exactly the kind of reflective negotiation that was needed. Perhaps this far into implementation was the earliest it could begin to happen. Trying to discuss such an issue *before* some experience

of teaching would have been unproductive, and perhaps there were signs of the group moving from a period of storming to one of norming. In this way, therefore, the progressive introduction of D&T itself proved to be a means of provoking professional discussion. The more teaching that had to be done, the more people's minds were focused on actual classroom practice rather than on what they conjectured might be the implications of D&T. Peter once observed that "It focuses the mind" (R) when there was more D&T to be taught than thought about. What it does mean is that issues of the nature of D&T in the classroom and its pedagogy did begin to get discussed, and what tended to be missing was any discussion of an overall view of technology in the world, in order to ground D&T in school with activities in the world. Perhaps such a discussion was just too far removed from everyday pressures and too unsupported to be valuable. In the absence of clearer guidance nationally about the nature of D&T and about its links with activities in the outside world, issues relating to the broader rationale for D&T were rarely discussed. There was some searching for a broader meaning and links with the world (such as the discussion of the role of craft skills), but far more time was spent struggling somehow to draw together meanings and rationales associated with the subjects previously taught. In terms of the process of curriculum change, there appeared still to be a long way to go in terms of developing new, agreed meanings for D&T at much more than the level of generating pragmatic teaching materials.

The role of BS

Although the appointment of Eleanor to be in charge of coordinating AT5 across the curriculum had addressed one gap in the management of the implementation of the national curriculum, the relationship of BS staff, and their contribution of teaching within the technology department had not been resolved. In teaching terms, BS staff were contributing what they were told, and Sylvia was still giving most of her attention to the other agendas within BS. Two separate events served to focus attention again on the relationship of BS with the rest of the department. The first was that funds became available for an upgraded computer network, causing the head to ask for information about

how this would be used within D&T if the existing BS network were to be replaced and cascaded to general use. The second was that the information coming into the school about the SATs that pupils would be doing at the end of KS3 was indicating that a *product* in some kind of material would be required, and an outcome from the BS area would not be appropriate. At this point the head discovered that the relationship with BS had not been sorted out, and his interpretation was that a CDT-HE axis was operating against BS. It had certainly been true that both CDT and HE could see the logic of their own working together more than that of working with BS, and that BS was not motivated to join in. Peter was already beginning to talk about BS as a "service" area - but that would only be consistent with it being mainly concerned with AT5 which would have a similar relationship with other subjects in the curriculum. If BS was contributing skills, rather than any other kind of input, then this seemed a likely solution. It provoked the head to observe that, although he could see that a short-term response was being made, there was no long-term planning. It was a pragmatic response to the need to solve problems such as staffing and timetabling one year at a time, with a thought in the background all the time in CDT that things may change. Certainly it suited Peter's management style not to embark on wholesale change when the evidence from other national curriculum subjects (science in particular) was that the initial Order would not be the final word. Whereas the Order and the NSG and the subsequent In-set material did give clues, the information that was awaited most keenly was that relating firstly to SATs and secondly to KS4. I noted previously that, in pre-D&T times, CDT and HE had developed much of their KS3 activities on the basis of what was required for their GCSE courses in KS4. In theory, within the national curriculum, D&T had been specified as a whole, from KS1 through to KS4, with examination syllabuses established on the basis of the Order. Therefore KS3 activities had to be constructed from the Order without a clear view of how D&T would be resolved into a GCSE subject. Unfortunately the available information about how to construct the nature of KS3 D&T was proving difficult to interpret. Therefore, the arrival of information, no matter how tentative, about the form that SATs would be taking, tended to assume a greater significance than other kinds of information, because that was seen as being the eventual acid test of the teaching of the department. Thus, another aspect of the

government's coercive strategy - the national testing of pupils against standard tests at the end of KS3 - was an influence that made these teachers want to prepare their pupils well for these tests. Whether or not that is the same thing as providing their pupils with valuable educational experiences is a moot point that will be reflected on in the final chapter.

7.3 January-July 1992: national and local developments

Just as the staff of Uppgrove School were beginning to feel that they had got through the worst of the change, and were beginning to understand what the Order required, controversy broke out again at national level. It is necessary to return to events at national level because their outcome changed the circumstances in which schools were carrying out the implementation. After discussing the national issue, I shall take up the school-level account.

National developments: "Technology in the national curriculum is a mess."

So began a report prepared by Alan Smithers and Pamela Robinson (The Engineering Council, 1992). As the authors observe: "This document was originally prepared as a confidential briefing for The Engineering Council, but we are delighted that it has been decided to make it publicly available". The Introduction went on to note

What has emerged seems to be very different from what was intended. Her Majesty's Inspectors are reporting that the standard of work in secondary schools, where national curriculum technology has been running for five terms, is actually declining ... It is proving extremely difficult to devise the required standard attainment³ tasks ... Those for age 14 have already been scrapped (The Engineering Council, 1992, p.5).

What hit the headlines, of course, was the opening sentence about technology being in a mess. The irony is that the claim that "what has emerged seems to be very different from

3 [sic] - the correct term was "assessment".

what was intended" highlights the obscurity of the 1990 Order. Intended by whom? Intentions communicated how and to whom?

The Engineering Council document was not the only response to the first attempts to implement D&T. Her Majesty's Inspectors had prepared a report (DES/WO, 1992) based on visits to schools, and this report informed the subsequent National Curriculum Council *Case for revising the Order* (NCC, 1992), which was published immediately after the Engineering Council document. The following extract from the HMI report⁴ shows several observations that indicate parallels with the situation in Upgrove School and corroborate my own findings about the implementation process:

Visits to all schools showed that ... :

the great majority of teachers have worked hard to implement National Curriculum technology;

many teachers have found the D&T aspects of the Order unhelpful and difficult to understand ... the Order is, in places, open to differences of interpretation;

teachers have had insufficient time to plan teaching approaches and revise their schemes of work for D&T ...

much National Curriculum INSET was of good quality, but modest in amount and mainly of an introductory nature ...

schools have devoted a great deal of time and effort to considering assessment and recording in D&T, but few have developed satisfactory policies and practices ...

at a time when teachers need advice and support with the introduction of

⁴ Based on the inspection of (amongst others) 438 secondary schools in 95 L.e.a.'s in England. 2613 lessons were seen and additional information was obtained from routine meetings with L.e.a. inspectors and advisors and through visits to school-based and L.e.a. in-service education and training sessions.

technology many LEAs have reduced the number of advisory teachers, and closed specialist technology INSET centres, often in order to reduce expenditure and to enable them to delegate more money to schools.

Visits to secondary schools showed that ... :

in all schools D&T was timetabled and organized separately from IT ...

successful D&T lessons were more frequently found in schools where staff planned the work together but contributory subjects were taught separately by specialist teachers;

much D&T lesson planning was piecemeal, with little evidence of the broad range of experiences required by the Programmes of Study ...

the co-ordination of D&T presented considerable difficulties in many schools; few co-ordinators had received specialist training to meet the demands of the National Curriculum (DES/WO, 1992, pp 9-12).

The indications are clearly of problems with the national specification of D&T and with the change strategy adopted. Although Upprove School had its own set of problems associated with the unique circumstances at school, department and individual level, it was not alone in having to face the difficulties inherent in the national approach to introducing D&T.

The *Case for revising the Order* (NCC, 1992) stated:

Teachers have not ... found it easy to translate ... [the approach which underpins the Order] into effective classroom practice. Their problems stem, in part, from the fact that technology is a radically new subject which represents a major challenge to previous understanding and practice ... the experience of implementing the Order has prompted a number of concerns ... about the intelligibility and complexity of the Order ... and about the lack of a coherent identity for the subject as a whole (NCC, 1992, p.1).

One is left wondering about the thousands of teachers struggling just like those in Upprove School, trying to implement it in the classroom for those five terms having themselves said

similar things the moment the nature of the published Order became clear. The lack of clarity of the Order, the possibility of a range of interpretations, lack of time, lack of In-set support, lack of training for co-ordinators are all issues contributing to the difficulty experienced by teachers in constructing meaning for the change from their previous experience. What is revealed is inadequacy in so many areas critical to a successful normative-re-educative implementation strategy.

In Upgrove School there was generally a feeling that anything that tightened up on the original Order, and clarified what "it" was, would be a good thing. By this time, and despite all the above problems as they affected this school, these teachers were increasingly confident that their version of "it" was as good as the next school's. Informal contacts with other schools in the l.e.a. and some feedback from visiting inspectors had combined to develop a degree of confidence. The Engineering Council report did provoke renewed concern in HE about the inclusion of their specific contribution, and suggested the likelihood of further battles to be fought from that area. For example, it declared that:

the "language" of technology is essentially the knowledge areas (including materials, electronics, instrumentation, fluids, structures) and skills (including control, measurement, assembly, construction, project management) applied to a particular class of practical problems, improving or inventing products or systems (The Engineering Council, 1992, p.16).

This seemed to suggest a return to the view of technology drawn from the classical engineering subjects. However, Joan was also hoping for a clarification of the skills and knowledge that would be needed, and was more encouraged by the NCC's approach. She had discovered how little credit could be given within the 1990 Order for the actual *making* of a product, and was feeling that she would prefer to be able to give more marks for the quality of pupils' products. Although HE teachers (nationally and locally) had renewed and particular concerns at this stage about further loss of HE from the curriculum, all the D&T teachers in Upgrove School had views about the possibility of a review. For example, Peter, subsequently doing the rounds of schools in his GCSE moderator role, felt that most D&T teachers of a CDT background were "pretty pissed off" (S) with the

prospect of another round of changes, although mixing this with satisfaction at the prospect of some tightening up and clearer revelation of what "it" was. Tony's observation at this stage, about the prospect of another round of changes, was that he had "known nothing different [from having to face new things]" (R) in his short career as a teacher. Several other staff of the department reflected that if only they had stood still in the first case, the world would probably have come back to where they had started from and saved a great deal of hassle.

Implementation progress at school level

While renewed politicking between interest groups at national level became directed at the review of D&T, the job of teaching the 1990 version had to keep up with the requirements that were being revealed. SATs were on the horizon (despite rumoured problems with the trial versions), and the staff's intentions were firmly to give the next year's Y9 pupils (the first to do the SATs) the best preparation. Although Upgrove School was not involved in the trialling of D&T SATs in the summer term of 1992, two schools in the l.e.a. were and information was sought from that source. As much information as possible about the form of the trial and actual SATs was obtained through formal and informal channels.⁵ The received information was applied micropolitically at several levels in the school. First, the old battle with the timetabler was re-opened at technology department level, because it was felt that Y9 pupils needed the longer half-day sessions in order to work best at the long tasks likely to be associated with the SATs. Second, a timetable-related but also inter-departmental issue was that of getting the best-equipped staff teaching the SATs groups. Neither Joan nor Peter wanted BS staff teaching Y9 pupils. Again, this illustrates how the emerging nature of D&T, this time deriving from SATs, was generating a new set of constraints for each year of implementation.

⁵ The staff of the technology department in Upgrove School certainly made sure they had a set of the Staffordshire "SAT pack" to back up the information made available to staff about the SATs in November 1992. These SAT packs achieved some notoriety when the TES of 12th February 1993 drew attention to a "Probe into pass kits for technology tests", in which it was reported that some schools had made the information prematurely available to pupils.

A final school-level matter was that, towards the end of the school year, i.e.a. money became available for the second phase of refurbishment of the CDT accommodation, which would include (at last) the provision of a technology department staff area. In this instance, it proved possible to carry out much of the work during the summer holiday. This marked the completion of the head's plan for the physical relocation of the teaching facilities of the three previous departments. There was the potential here, therefore, for a large step in the direction of the formation of a subject department - the setting up of a unified territory which would enable clear identification by staff and pupils and offered the potential (through the staff area) for greater ease of informal negotiation.

End-of-year reflections

The end of the 1991-92 provided the opportunity for reflection with various people on the first two years of implementation. Selected comments from such reflections shed light on several of the long-running issues of implementation in the school: choice of content for D&T activities, assessment, staff attitudes and staff development, and communications within the department.

Sharon⁶

Sharon had completed her first year in the school, and it is interesting to note some of her observations as someone coming into the school from teaching elsewhere. She had been working as a head of HE in another i.e.a. when a family move required her to leave that job just before HE "underwent the demise" (TS). She had filled in with various temporary jobs including secondary science and primary work until obtaining this HE post at Upgrove School. Her previous experience within HE was that the departments tended to be small, so she was aware of the transition to working with the larger group now comprising the technology department at Upgrove School. She felt that the larger group "presented

⁶ Information taken from a taped interview in July 1992 and various informal conversations.

some difficulties" (TR) simply because HE teachers were used to working in small departments. She particularly identified the difference between formal and informal communications. She felt that in general informal communications were preferable to and more effective than formal ones because they tended to be spontaneous and on a need-to-know basis, and that in this school the physical separation between the HE, CDT and BS staff presented the biggest problem to their effective operation. Even though CDT and HE were now in adjacent areas, she felt that the need frequently to stay in the rooms even at break and lunch times, because of pupils working, inhibited informal contact. However, she felt that the promised arrival of a common staff room would help.

She had formed opinions about the approach in this school to teaching and assessment within D&T. Her view about the content of HE was that "you can fit most things in if you really want to" (TR), which is in line with the rather pragmatic and somewhat criticized approach to the emerging nature of the new subject. She had found that assessment required her to be "too picky" (TR). Expanding on this, she said that she felt that manageable assessment had to be possible by being able to look at a piece of work as a whole, get an idea of the level or grade, and then locate the evidence. She felt that, given more experience of marking the pupils' work within the D&T Order, she would be able to mark in this more holistic way. Her view in this respect, therefore, had more in common with that expressed by CDT staff than that of the early stages of D&T in HE in this school.

Len

Len was offered a retirement deal that allowed him to leave in July 1992. During the last week of term he offered me his copy of the 1990 Order - gesturing to where it lay on the bench. It turned out to be lying on top of a mock funeral pyre made of wood offcuts. Len was glad to be going: he had no wish to begin to engage with the requirements of D&T. His retrospective reflections simply echoed what he had been saying all along but now, he felt, confirmed by the comments being broadcast about the shortcomings of the 1990 Order. As far as he was concerned, "educationalists" had meddled with things about which

they knew too little with inevitable consequences - "another cock-up!" (S). The school gave him a good send off. They got "our old head" back to do the farewell speech, who had recalled some of the things Len had done over the years - like taking it upon himself to build access ramps round the school for a pupil who used a wheelchair. Len had contributed a great deal to the school over the years, and not just in the teaching of woodwork to boys, which he maintained was what he had been appointed to do. Unfortunately, the world beyond the woodwork shop changed considerably during Len's career, and for too long he was neither expected nor encouraged to anticipate the need for change in his own practice.

Phil

Phil's understanding of the intentions for SATs was that there were to be no graphics outcomes. This was further confirmation for him of the demise of his subject, and made him realize that his teaching in Y9 would have to be in a medium appropriate to a SAT. At this stage he was all for retiring, like Len, but wasn't at the right age. With a year's experience of teaching Y8 D&T, and the emerging nature of the teaching required in Y9, he was reverting to a generally gloomy frame of mind, as opposed to his relatively up-beat approach to revitalizing some of his teaching activities at the corresponding time last year.

7.4 September-December 1992: into the third year of implementation

In this final term of the fieldwork, D&T had completely replaced its predecessors in KS3, and the last groups to study BS, CDT or HE GCSEs were embarking on their courses in Y10. This section reflects briefly on the Technology Department as it had become by this stage. It must be appreciated that, although the arrival of D&T throughout KS3 was a significant point in the change process, it was by no means the end of the changes facing the department.

Performing?

The third year of implementation saw the completion of the refurbishment of the CDT area that marked the final demise of the CDT-art staffroom. When the renewed facilities, complete with staff area, came into operation, Eleanor moved in immediately. She reported this as a definite decision to identify with the Technology Department. She wanted to improve the informal communications with the other technology staff. Members of the HE staff also began to make more use of the new staff area, although they continued to be frequently kept busy in their teaching rooms. Len had not been replaced: the decrease in CDT staff being compensated for in this year by a drawing-in of the remaining four to focus on D&T/CDT classes by reducing their teaching contribution to other subject areas. A by-product of this was to draw a clearer boundary around D&T staff - emphasising its nature as a subject department.

Figure 7.3 (overleaf) shows the version of D&T implemented throughout KS3 in this school. Y7 and Y8 consisted of skills inputs followed by two projects. Y9 contained an enterprise activity and the space for the SATs long tasks.⁷ As time went on and the staff's confidence grew it was interesting to see how the boundaries of what were felt to be acceptable D&T activities were extended. For example, Tony was always one for supporting pupils who wanted to experiment. Thus, one lunchtime, I found one Y9 girl doing classical wrought iron work and another one making a small leaded window. Advice for this latter project had been sought from a local craftsman, who had supplied not only advice but also some of the necessary materials. As before, Tony was practising what he preached about pupils doing the work for sheer enjoyment, artistic outcome and personal development, as much as for a need: "If the kid wants to do it, isn't that a good enough need?" (Tony, S). Tony was in the business of creating his own meaning within D&T.

⁷ The D&T Standard Assessment Tasks required pupils to design and make a selected product over a period of time, and then to be set a short, related task. This latter task was, along with other SATs, boycotted by teachers nationally.

Y7

SKILLS INPUTS					EXTENDED PROJECTS			
FOOD	WOOD	TEXTILES	METALS	BUS. STUDIES	CONTEXT	HOME	RECREATION	RECREATION
					THEME	LOOKING AFTER A YOUNG CHILD	HEALTHY EATING PICNICS & BARBECUES	LEISURE ENVIRONMENTS

Y8

SKILLS INPUTS					EXTENDED PROJECTS			
GRAPHICS	BUS. STUDIES	FOOD	SYSTEMS	TEXTILES	CONTEXT	SCHOOL	COMMUNITY	INTEGRATED PROJECT
					THEME	ENERGY INSULATION & QUILTING	TEMPERATURE CONTROL	SAFER CARS

Y9

SKILLS INPUTS					EXTENDED PROJECTS			
RESISTANT MATERIALS	GRAPHICS	FOOD	CONTROL SYSTEMS	TEXTILES	CONTEXT	BUSINESS & INDUSTRY		CHOICE
					THEME	MINI ENTERPRISE	N.C. PRACTICAL TASK	

Figure 7.3 D&T as implemented throughout KS3 in Upgrove School.

By December 1992 there were still many issues of implementation to be faced (particularly regarding D&T in KS4), and uncertain prospects about the next turn that D&T would be taking nationally. But the atmosphere in all parts of the department did suggest that a general transition from forming through storming to norming and performing was perceptible. The management of the department had been clarified, formal negotiation through meetings was becoming a more familiar process, the department was establishing a territory that a) helped with its identity and b) made informal negotiation rather more likely. Shared meanings were gradually being constructed at the level of D&T in the classroom (regarding the use of themes, the place of skills development, and the nature of assessment) in a way that made it slightly easier to respond as a unified department when the latest revelation about SATs or KS4 or the review came along.

This chapter has followed up on the development of the key issues that arose from the initial need to respond to D&T. It has considered the effects of national and school-level strategies for change, recognizing that a nomothetic perspective (seeing the organizational changes at school level) has to be balanced by the idiographic perspective that demonstrates the importance of individual response. It has shown how weaknesses in the view of technology presented in the national Order led to the construction of classroom activities derived from existing subjects and organised pragmatically around themes (as suggested in NCC material). The next chapter reflects on the whole of Chapters 4 to 7, reviewing the validity of the hypotheses presented in Chapters 2 and 3, and drawing some conclusions about the change process and the nature of D&T.

8 Reflections and conclusions

8.1 Introduction

This final chapter draws together the evidence that supports the thesis. In Chapter 1 the thesis was summarized as follows:

The existence of many interest groups in the new area of design and technology in the national curriculum makes the processes of specifying the subject at national level, and implementing it at school level, difficult and controversial. For the processes of curriculum change to take place effectively, a strategy for change is required that recognizes the conditions within which teachers work, and the structures of organization and meaning that support their work. In the case of subject teachers in secondary schools, this means recognizing the influence of subject and departmental interest groups, as well as the influence of school organizational structures. Failure to apply such a strategy inhibits the change process and may result in outcomes that are less satisfactory than is desired.

In arguing the case of this thesis, six hypotheses were introduced in Chapters 2 and 3. The validity of some of these hypotheses was demonstrated within Chapters 2 and 3, and the evidence for these will be reviewed briefly in this chapter. The remaining hypotheses will be the subject of further reflection in this final chapter, confirming the validity of the thesis. In demonstrating the validity of the thesis (in section 8.2), I shall draw some conclusions about the process of introducing D&T in the period up to January 1993: particularly about the influence of interest groups and about the nature of appropriate change strategies. The conclusions will consider in particular the influence on the change process of interest groups - as identified in Chapter 2 - but as they operate at school level. The conclusions will also relate to the framework of understanding of the change process - based on the need for effective strategies for changing human behaviour - introduced in Chapter 3. In section 8.3 I shall reflect on the nature of D&T as it was beginning to emerge as a school subject, using the ideas developed in Chapter 2. In that section I also suggest one tentative but potentially important link with research being undertaken by McCormick, Hennessy and Murphy (e.g. 1993) into pupils' problem-solving in D&T.

8.2 The process of change

The process of change that involved the staff introducing D&T in Uprove School is considered now through a review of the hypotheses. The first three hypotheses relate directly to the existence of a range of interest groups in the area of technology education.

The first hypothesis is that, in three significant areas of understanding of its nature, technology education suffers from a lack of agreement between interest groups. The areas are i) the nature of technology in the world, ii) the nature of technology in the curriculum, iii) the nature of an appropriate pedagogy.

The second hypothesis is that the range of interest groups in technology made the process of specifying the subject within the national curriculum difficult, and the national intentions controversial.

The third hypothesis is that some conflict is inevitable at school level when teachers from different interest groups (within and between subjects) are required to work together to implement the new nationally-specified subject.

The first hypothesis has implications at national and school levels. The second and third derive from the first but relate respectively to the national and school-level situation. The validity of the first was demonstrated at national level in Chapter 2 by considering the views of interest groups operating at national level well before the beginning of the process of defining D&T in the national curriculum. Here it was shown that the interest groups had a range of views about the nature of technology both in the world and in the curriculum, and about appropriate pedagogies. Thus, for example, the technical education group (pp.26-29) view technology as the industrial application of science, leading to a school subject selecting knowledge and processes from such applications, and seeking a pedagogy that develops "know how" as much as "know that". By contrast, the design group (pp.31-35) often views technology as being just one arena of activity for designers who use an all-embracing design process, sees technology in the curriculum as just one form of applicable knowledge, and looks for a problem-solving pedagogy emphasising

creativity. Such a range of views has resulted in different emphases being placed on the way that technology should appear in the curriculum, resulting in courses that certainly contained *aspects* of technology but which were highly selective of content and approaches when compared with the breadth of technology in the world. For example, GCSE CDT: Technology focuses on knowledge of structures, mechanisms, electronics, etc. and developing capability in designing and making products; whereas the ASE's Science and Technology in Society material focuses on developing an awareness of the value issues inherent in the technological applications of many science-based processes. The resulting curricular inclusions of aspects of technology were, because of their narrow selectiveness, subject to contemporary criticism (e.g. from HMI (DES, 1985a), from Black and Harrison (1985) and from the Open University (O.U. 1987b, 1987c)) as noted in Chapter 2 (pp.48-51). Pedagogies either tended to be derived from those of earlier but associated subjects (such as crafts, art or science) taught by the same teachers, or were more explicitly related to the development of resources, awareness and capability (as classified by Black and Harrison (1985)). McCulloch, Jenkins and Layton (1985) had noted how the lack of agreement between national interest groups had inhibited the growth of technology in the curriculum up until the middle of the 1980s. The decision to include a subject called technology in the new national curriculum made it apparent that decisions would have to be made in the areas of disagreement, such as the breadth of content, the balance between content and process, the place of skills development, and the place of design as just one of many technological processes. Although much of the discussion between individuals representing interest groups went on behind closed doors as the national intentions for technology were evolved (McCormick, 1990a), the published outcome provoked debate (pp.60-66) that revealed the inherent tensions.

The validity of the second hypothesis (which relates to the national specification of D&T) was demonstrated in Chapter 2 through discussion firstly of the range of opinions that became evident during the process of defining technology in the national curriculum (pp.56-60) and secondly through discussion of the pragmatic outcome in the statutory Order for technology which centred on processes associated with designing and making

and left content quite open (pp.60-66). I showed there how this outcome immediately (and perhaps inevitably) attracted criticism from individuals and interest groups. Further evidence for the controversial nature of the statutory Order emerged in Chapter 7 (section 7.3), when the criticisms by HMI and the Engineering Council of D&T as implemented drew attention amongst other things to the shortcomings of the Order.

The third hypothesis draws attention to the likelihood of conflict between interest groups at *school level* in the implementation of D&T. Chapters 5 to 7 provided ample evidence in support of this hypothesis, but it is important to reflect now on the *reasons* for the conflict, rather than simply note that it happened. Establishing the reasons for conflict provides the basis on which the validity of the remaining hypotheses (which relate to the process of implementing D&T) can be established. In Uprove School conflict arose for several reasons, each of which will be considered in turn:

- the difficulty of constructing meaning for the statutory Order from the basis of existing subject meaning structures;
- concerns about individual and departmental status, identity and survival;
- difficulties arising from the change strategies at national, school and departmental levels.

The construction of meaning

The subject teachers in Uprove School constructed meaning for what they were doing partly on the basis of their own subject-based training and partly on the basis of their subsequent experience of teaching - particularly within examination syllabuses in their subject. National subject communities in general (especially when they develop a structure of public examinations) are largely independent of each other, so meaning and normative language tend to be *within* rather than *across* subject groups both nationally and in schools. I showed in Chapter 6 how CDT and HE teachers were *separately* able to construct meaning for assessment procedures in D&T, based respectively on existing CDT and HE

meanings, but were unable initially to construct a shared new meaning. Such a difficulty indicates how the arrival of a new document (the technology Order) offering a new normative language revealed these differences as attempts were made to construct new meaning across several existing subjects. The negotiation of a new normative meaning structure was made that much more difficult because the areas of definition (technology in the world, in school, and its pedagogy) were not sufficiently clarified at national level (as suggested through my first and second hypotheses). Each of the three areas of definition is now considered in turn. In demonstrating how disagreement in these areas contributed to conflict in the implementation of D&T in the school, this will also confirm that the first hypothesis applies at school level.

Technology in the world and in the curriculum

In Upgrove School the staff who were involved in implementing D&T did not on the whole have well-developed views of the nature of technology in the world. In CDT, views about aspects of technology in the curriculum were those associated with earlier subjects and their interest groups. Thus, for example, Len's underlying views were those of a craftsman in wood who had entered teaching to pass on in apprentice fashion the skills and understandings associated with the work of a joiner or cabinetmaker. Phil constructed his meanings by reference to the skills of visualisation and graphic communication associated with the world of technical drawing and graphic design. Len and Phil had clear understandings about how what they taught in school related to activities in the world - but these understandings did not include meaning for technology as such. For Peter, Tom and Tony, the idea of "design as the process" and "technology as the content" (as specified in the GCSE CDT: Technology syllabus) was typical. For them, the nature of technology in the curriculum tended to be derived from those expressed in the CDT examination syllabus documents that they used. What is evident is that these school-level meaning structures reflect the situation nationally (pp.39-41) of CDT as tending to a functional school subject, but searching for its own identity in particular with regard to clear links with activities in the world. Concern and conflict were, therefore, rooted in the progressive loss of existing

rationales without clear new ones.

In the BS and HE departments there were no well-formulated views about technology in the world or in the curriculum. There were, however, clear views in these latter two departments respectively about the nature of BS and HE as subjects in the curriculum, and about how these subjects related to activities in the world beyond school. Concern arose in HE in particular because the national literature offered no clear rationale for D&T in the world and the curriculum to replace those clearly articulated for HE.

Pedagogy

The overall pre-D&T normative pedagogy in the CDT department was largely derived from the model inherent in GCSE CDT syllabuses. This meant, for example, that pupils had to practice the "design process" in order to become proficient at it by the time they reached Y10 and Y11. The main disagreement with this pedagogy *within* CDT arose with those teachers who had previous experience of teaching in the skills-based approach of boys' craft subjects, in which pupils progressed through a series of set pieces with the intention of building up their manual skills and their understanding of the nature of the material. The pedagogy in HE prior to D&T had also developed in line with the perceived expectations of GCSE courses, as reinforced by the interpretations of advisory staff. The move in food preparation from "I demonstrate, you make" to what was normatively described as an "investigative approach", and the move in textiles to an approach that allowed pupils to design as well as make an artefact, rather than follow a prescribed pattern, had not been without misgivings in Upgrove School HE department even before the introduction of D&T. The particular version of the approach adopted in this school was not above challenge within the department. Basically, however, the pedagogy adopted by the mid-1980s in both CDT and HE was felt *in the respective departments* to fit in with the process-based ATs of D&T. The technology Order did provide a potentially normative statement in broad process terms through its four Attainment Targets and its Statements of Attainment for the various levels within Key Stage 3. Those staff in CDT and HE who had

already adopted a process-based pedagogy had to consider these new norms of language in the light of their existing norms in their attempt to construct new meaning for what they should be doing. But the new Order was itself the subject of interpretation and therefore needed negotiation between departments and individuals. The interpretation was possible, if hindered by lack of clarity in the Order, but the negotiation proved quite difficult in Upgrove School because of a range of historical circumstances affecting the nature of the school, the departments, and individual teachers - the subject of the fifth hypothesis to be considered shortly. CDT and HE teachers involved in the teaching of D&T were all able to derive from existing activities pupil material that was based around the D&T processes. It was the BS teachers who found themselves furthest from the process-based D&T pedagogy, being still essentially focused in this school on the development of (vocational) skills. Consequently they had the largest task in constructing a meaningful pedagogy from a process-based Order.¹

The critical difference over pedagogy was related to the role of *assessment* and its potential integration with teaching materials. The origins of this difference were over interpretation of the *general* nature of the national curriculum, rather than D&T in particular - as to how much it represented the letter or the spirit of the law. However, in *this school* it happened to be that the difference of interpretation happened between subject departments. It is the fact that there *was* such a difference, and that it caused such anguish, that is important, because it is symptomatic of the difficulty of constructing meaning from the Order. In this school, the pedagogy for D&T was derived from that developed within the earlier subject understandings, tested against the Order with whatever help was available from the Non-Statutory Guidance or any other source of information that was felt to be reliable. But this work of construction of meaning was carried out for at least a year largely *within* the previously-existing subject departments, with little formal or

¹ The reactive, rather than proactive, response in BS to constructing meaning contrasts strongly with that in HE. Whereas the proactive HE approach provoked a clash with CDT, the reactive approach of the head of BS was more a source of frustration of the intentions of Peter and Joan for D&T, than a source of direct conflict.

informal negotiation of this crucial issue *between* departments.

The need to construct some kind of overall meaning and pedagogy for D&T resulted in the use of *themes* which were the nationally-approved method (through National Curriculum Council In-set material) of enabling the development of D&T capability in a range of contexts: D&T capability being the sum of the four ATs. Themes were adopted in Upgrove School (in the 1990-91 school year, *Entertainment* and *Leisure*), but the feeling on the part of the staff that practice at *skills of making* was essential before any attempt by pupils at a "design and make" project, influenced the form of the approach used within the themes adopted throughout KS3. Many basic skills were taught in short "skills inputs" first, and were subsequently developed and others introduced on a "need-to-know" basis in the later projects. Those skills deemed to be essential (such as use of a sewing machine or use of various cutting tools) were invariably taught in the skills inputs where the staff could be certain that they would be done by all pupils. Despite the inclusion of such skills, Len and Phil in particular felt that the overall continuing reduction in skills practice further eroded what they perceived to be the value of what they wanted to teach, so this continued to be a contentious issue within the CDT part of the D&T department.

The existence of a range of meaning structures (particularly for pedagogy) brought to bear by those teachers required to teach D&T in Upgrove School confirms the validity of the *first* hypothesis at *school level*, as well as confirming in part the truth of the third hypothesis. The third hypothesis relates to conflict at school level, and this has further dimensions (other than those relating to the nature of technology education) previously noted, which will now be explored in further confirmation of the third hypothesis: those of status and of problems with the change strategy.

Individual and departmental status, identity and survival

The staff forming the D&T curriculum area in Upgrove School had achieved professional standing in the school and the l.e.a. through association with a clearly-defined subject (BS, CDT or HE) each offering a range of public examinations. Each subject head of

department was able to make some constrained but autonomous decisions in the school. The replacement of three groups of examinable subjects by one, and the formation of a curriculum area (subsequently a new, single department), changed the *status quo* in this regard. The negotiation of new meaning had to take place in the middle of a situation where previous norms of personal and departmental status were changing. The new subject required a reduction in the amount of content taught, which raised issues of what was valued and why and how the integrity of previous subjects could either be retained in some way or could be developed into a new integrity. The absence of any clear new integrity left HE staff, in particular, disheartened and feeling that much of what they valued had been removed from the curriculum, without any replacement with something having equivalent meaning and integrity.

In CDT, the continuing hybrid nature of that department, even before the change to D&T, resulted in further significant issues of loss of identity and status. The previous introduction of CDT had itself caused Len to experience the loss of the identity and status he enjoyed as a specialist woodwork teacher. By the time D&T came along, his reaction was that this was just more of the same. It was Phil who, through the introduction of D&T, faced for the first time the prospect of a loss of his identity and status as a teacher of Design and Communication. His repeated remarks about becoming "just a small cog" are symptomatic of his frame of mind. He could not find a new meaning for what he was being required to do. Whereas he could make his own connections between his Design and Communication teaching and activities in the world beyond (as part of his view of the integrity of his "subject"), he could not make such sense of the new requirement.

The approach within the national curriculum left all these issues of departmental and individual identity and status entirely to be dealt with at school level: appearing to assume that cooperation between departments in the establishment of a new subject would be unproblematic in this area - dealt with organizationally by the assembly of staff teams and pedagogically by the use of themes.

Change strategies at national, school and departmental levels

The final dimension of conflict is a consequence of the nature of the change strategies employed in enabling teachers to implement the new curriculum. The previously-detailed aspects of D&T implementation - the existence of interest groups with a range of ideas, and the necessary changes in individual and departmental status - reveal the likelihood of conflict at all levels. Whilst there were problems with the national strategy (likely, therefore, to affect all schools), Upgrove School had its particular problems with school- and departmental-level strategies for change. The strategies applied at each level will be considered in turn. The use of a national change strategy that did not address this conflict, and suggest steps to deal with it, was itself a factor contributing to the conflict. The problems with the national strategy were partly the use of an overall power-coercive approach - imposing the need for teachers to begin teaching something different - and partly because this overall strategy contained an empirical-rational view that ignored the need for teachers to be enabled to change their normative attitudes and behaviours. Chapter 3 demonstrated that the national strategy for implementation was, as regards acknowledgement of the nature of the change process, fundamentally flawed in its inception. Chapters 5 to 7 showed the problems that this approach presented at school level when the material, time and support necessary for construction of new normative meaning structures were not available.

The head of Upgrove School adopted a school-level approach to change that anticipated the need for negotiation and reconstruction of meaning. This revealed his awareness of the need for an overall re-educative approach to the development of new norms, although he offered his staff an essentially rational *process* of formal meetings to the achievement of this end. The historical circumstances of the school meant that, in the first instance, many of the staff were unfamiliar with this formal approach to negotiation, which meant that, in D&T, this strategy was not as effective as the head had hoped.

At departmental level, Peter, Joan and Sylvia adopted different strategies within their own

departments and, in the case of Peter (as overall convenor), within the curriculum area. The strategy adopted by each related partly to their personal management styles and partly to the circumstances of personal and departmental survival in which they perceived themselves at the time of the formation of the D&T curriculum area. Peter, having adopted a long-term re-educative strategy with his own CDT staff found that the pace of change and the enormity of the task overtook this approach. The two key HE staff, Joan and Alison, worked together within their department to re-educate themselves and derive new norms. Sylvia's approach was one of relative passivity, which ultimately frustrated the intentions of both Peter and Joan. The differences in departmental strategies in this school added to the conflict.

Within each of the dimensions contributing to conflict - the construction of meaning, status and identity, and the problems with change strategies - the evidence supports the third hypothesis.

The fourth hypothesis takes up the issue of the national change strategy, which is now considered in more detail against the evidence from Upgrove School.

The fourth hypothesis is that the features of a normative-re-educative strategy are most suited to enable teachers to carry out curriculum change, but these features were not adequately recognized in the case of teachers being required to implement national curriculum D&T.

The relevant features of a normative-re-educative change strategy were identified in Chapter 3 (p.95). Drawing on Chin and Benne (1976, p.23) as previously, they may be summarized, as they apply to the implementation by subject teachers of curriculum change, as follows:

- The teaching done by subject teachers is supported by the sociocultural norms of a subject community to which these teachers are in turn committed through normative attitudes and values.
- Changing the nature of the subject that is being taught requires teachers to :

change their normative orientations.

- Such changes in normative orientations involve changes in attitudes, values, skills and significant relationships, as well as changes in knowledge, information, and intellectual rationales for action and practice.

The evidence presented in the case study strongly supports the view encapsulated above of the way teachers carry out their job, with the consequent implications for a change strategy. The description of teaching as comprising subject-based normative behaviour sheds light on teachers' responses within the change process. For example, Len, a craftsman in wood, but lacking initial or in-service training as a teacher, felt he was fighting a battle to retain the norms he valued and understood and which had supported his work. He withdrew from the battle with his norms relatively intact, and ultimately reinforced when, as he saw it, the "educationalists" themselves decided that D&T was "in a mess". Phil was similarly rooted in a tradition within which he had been able to sustain a certain level of change, but which was disintegrating round him. Tom was able to distance himself from the detail of the Order and convince himself that the new norms were essentially in line with his own existing norms. Tony, having been introduced to the newly-emerging norms during his training, found less trouble than most in accepting the requirements of D&T because there was no mis-match between his norms and those of the new subject. Peter, trained in a way appropriate to CDT and finding himself having to come to terms with some new ideas (such as the extension of content to include food and textiles), nevertheless felt that D&T conformed sufficiently well to his previous norms that he and his department ought to be able to encompass the changes, given the will to do it.

I have previously noted the vigorous attempts made by Joan and Alison to re-educate themselves into new D&T norms whilst feeling in their souls that the HE norm was still valid. The outcomes that they produced in terms of re-orientation of pupil material might be interpreted as an empirical-rational (if coerced) response. A rapid inspection of lessons and pupil material might have provided "evidence" that the strategy of the NCC/DfE was working. However, the personal anguish provoked by the changes showed that this was not

the case, but that the coercion provoked an unsupported process within which the major struggle was to construct a meaning structure for D&T (shared with other subjects if possible, but if not just to make sense within HE) to replace that of HE.

The features of a normative-re-educative strategy suggest the need for support and time for teachers to determine new meanings and norms. The evidence in Chapters 5 to 7 is that very little appropriate support was found to be available in this instance. Much effort was directed by the teachers most actively involved at finding support material from a range of sources, but it all needed interpreting for the local situation. No-one nationally or in the l.e.a. had been able to work out in anything other than the broadest detail what the implications were. Existing support networks (such as l.e.a. advisory teachers) were not given the opportunity to reorganize themselves or negotiate their own new meaning structures any sooner than teachers, so were put on a difficult timetable for preparing In-set material. Some l.e.a.'s did put on "rolling programmes" of D&T In-set but these were in parallel with implementation rather than before it. In the l.e.a. containing Upgrove School, the advisory service was still based on the original subject lines when D&T was in its first year of implementation. Issues of organizational restructuring and negotiation of new normative meanings had not begun between the three advisory teachers.

The national strategy of implementation of the national curriculum cannot be simply categorized into one of the three types identified by Chin and Benne (1976)(p.94) because it exhibits to some extent features of all three. *Power-coercion* manifested itself through the inclusion of the national curriculum within the 1988 Education Reform Act, the definition of programmes of study and statements of attainment in statutory Orders, and the statutory requirement on schools to report on pupils' levels of attainment. The overall power-coercive nature of the national strategy for implementation resulted in various local individuals becoming agents of that coercion. The head of Upgrove School had no choice but to arrange for the implementation of the national curriculum, so had to decide on his own strategy for change. That strategy in turn transferred responsibility to the staff, some of whom (particularly Peter and Joan) had, in turn, to become the agents of coercion. Peter

eventually had no choice but to timetable Len and Phil into D&T teaching periods and, therefore, had to attempt to encourage them into the frame of mind to teach D&T. Joan, especially after her appointment as head of KS3 D&T, felt obliged to chase up assessment information from other staff in preparation for external inspection. The language of some of the early documents about the implementation of the national curriculum showed characteristics of an *empirical-rational* approach: appearing to suggest (e.g. p.115-118) that there was a straightforward series of steps that would lead to the required result. The interim and final reports of the D&T working group tended to suggest that although D&T was new, it would "build on existing practice" in a fairly non-problematic way. The need for time, support and In-set for teachers was signalled in various places, but there is no evidence of any appreciation of the reconstruction of meaning and reorientation that would be facing teachers. The NCC In-set material (NCC, 1991b, 1991c, 1991d), when it became available, *did* set up activities for teachers that addressed issues of meaning identified as important within a *normative-re-educative* strategy. Unfortunately, it was largely non-directive in terms of possible answers to the questions, which failed to address the issue that many teachers were insufficiently confident within their existing subject-based understandings about the nature of design and technology to come to much more than pragmatic conclusions. In any case, these In-set materials could not attempt to address in depth the particular problems of individual teachers and departments that I have shown to exist at school level.

In the case of Upgrove School, the teachers who *were* willing to change felt themselves hampered in their desire to change by the lack of clear information and definition. Those teachers in this school who were engaging with D&T were keen to know if they were doing the right thing for their pupils. Consequently, when the review was announced, the comment was reiterated "If "they" will tell us what to teach, we'll teach it". Those teachers who were most open to "re-educative activity" found the available information insufficient for their needs. Their approach to D&T implementation tended to be to conserve existing subject content where possible, partly because they wanted to retain as much certainty as possible in what they were doing, if also partly to retain for as long as possible the

integrity of their own subject. A conservative approach in CDT tended to be rooted more in a feeling that D&T was fundamentally like CDT anyway, and the chances were that, if anything, D&T would tend back towards CDT norms rather than away from them. The generally conservative approach to change on the part of these teachers was grounded in their need to get on with the day-to-day task of confidently teaching their classes of pupils. However, although such a point can be reasonably claimed as being generally applicable to teachers, a fundamental tenet of this thesis is that the response to change in each school is a consequence of the unique combination of circumstances affecting individual teachers, departments and schools. This is expressed through the next hypothesis.

The fifth hypothesis is that individual teachers, departments and schools all have characteristics (which are partly to do with their present circumstances and partly with their history) that will significantly affect the change process in a given situation.

The school

I have shown how the historically-created culture of Upgrove School tended to impede the implementation of externally-required change. The school was relatively insular within its i.e.a., as a result of the first head's approach to running it. Viewed in terms of Schon's model of a social system (used by Weston, 1979), the school's structure focused on day-to-day running within an accepted theory - both structure and theory deriving strongly from the views of the first head, who took to himself many of the mechanisms of power² noted in Chapter 3 (p.107). This situation was not untypical of schools operating within the 1944 Education Act and, to an extent, was what provoked epithets such as the "secret garden". The evidence is that in the microcosm of its own society, this school was not failing in its day-to-day tasks.

² Defining the objectives and values for the school, determining the curriculum, controlling the internal organization, distributing money, choosing staff and controlling communications.

In terms of its "creativity" as a school (Chapter 3, p.104), the evidence is that, from its foundation, Uppgrove School demonstrated such creativity in its approach that sought a pedagogy that would enable as many pupils as possible to succeed within the system where success in academic examinations was an indication of achievement. The team of staff gathered by the first head were committed to this shared theory (to use Schon's term), and established a broad curriculum offering a considerable degree of pupil choice. However, the mechanisms for responding to externally-required change did not exist: the creativity of the school being largely internally-orientated. This internal orientation derived from the approach of the first head and was reflected in the organization of the school - particularly in the existence of large numbers of small, autonomous departments and the use of informal rather than formal networks of negotiation. Although the new head created a new organization and installed a formal system for negotiation, he was, at least initially, working with a staff who had spent much of their working lives in the previous culture. This historical legacy affected the way the staff responded to the head's initiatives as the school attempted to respond to the requirements of the national curriculum.

The departments

The three departments forming the D&T curriculum area (as it first was) each showed characteristics of subject departments (using Weston's (1979) classification). They had clearly-defined staff, territory and timetable slots. HE and BS had clear ideas about their rationale. CDT was less clearly a subject department, having members and activities associated with a range of subject communities (craft, technical drawing, design, CDT) which were themselves attempting to find a unified identity both nationally and locally. The process of coming together to form a single department exhibited features of *internal* relations (i.e. between staff belonging to the same department), as well as *external* relations (i.e. between staff of different departments). The impact of interest groups on the change process at school level was not simply between different departments, but sometimes within them.

The insular nature of the departments (resulting from the previous head's emphasis on work by subject specialists within departments) mitigated against the particular change that required a cooperative approach to the development and teaching of a new coordinated subject. Some schools in this l.e.a. had previously moved towards greater integration or cooperation between CDT and HE (if not BS), but this had been resisted on the whole in this school. The one-time CDT-science cooperation over the teaching of a CSE course had involved a particular CDT staff member who had a desire to cooperate with science, but who had subsequently left (i.e. it was an idiographic feature relating to individuals rather than a nomothetic one relating to the organization).

Within CDT, the culture was that of parallel practice rather than teamwork: the members of the various interest groups comprising CDT in this school having not reached agreement, even though Peter had achieved some movement in that direction. The CDT department, prior to the national curriculum, was very much a transitional, hybrid department (p.108), having its internal negotiations (particularly over the place of skills development). HE had a more unified and collegial approach than CDT. As Chapters 5 to 7 showed, there were frequently common views between Joan and Alison (e.g. about the movement towards greater pupil choice in the selection of items to be made, and over the use of sheets integrating work tasks and assessment). In HE, at the most critical time of constructing meaning with greatest uncertainty about the nature of D&T and status and continuation as a department, the close working relationship between Joan and Alison affected the way that department responded and the way in which that response was perceived by the other departments. The relationship between all three departments was affected by the different perceptions of any continuing place in the school's curriculum: CDT feeling generally secure, HE feeling threatened, and BS feeling that there was a future outside, as well as within, the D&T curriculum area.

Whereas such general departmental views are usefully recognized as dimensions of nomothetic analysis, I argued in Chapter 3 (p.103) that the nomothetic perspective needs balancing with an idiographic perspective, if a full understanding of the change process is

to be achieved. In turning now to consider the response of individuals within the change process, it has to be recognized that individual characteristics interact with departmental and school characteristics. It is the complexity of this interaction that requires the process of change to be studied in depth in a particular situation.

Individuals

An individual may have general inclinations to accept or reject the need for change, and these inclinations will be influenced by departmental and school characteristics. Particular changes may have good or bad characteristics, as Fullan points out (Fig. 3.1, p.93). However, for each individual teacher, there will be a unique answer as to why a particular teacher responded to a particular change in a particular way. I have suggested that for subject teachers, the response to curriculum change depends largely on an individual's ability to handle change within subject meaning structures that support day-to-day teaching. I also suggested in Chapter 3 (p.112) that the point that an individual's life and career as a teacher has reached will have a significant effect. The particular curricular change facing the teachers forming the technology department of Upgrove School was a unique combination of newly-specified, nationally-applicable curricular intentions, enforced by law and requiring cooperation in organization and teaching. The response of individual teachers, therefore, depended in part on their response to the coercion involved and in part on their response to the subject as specified nationally. Each teacher felt personally to an extent the effect previously noted at departmental level within either BS or CDT or HE. Added to that were the more individual responses, which will now be summarized.

Joan could see enough of what she valued from HE remaining in place to tip the balance in favour of remaining in her job and responding to the changes. Alison did not display any doubts about wanting to contribute to D&T because that was where the future now appeared to be and she believed she had something valuable to contribute to pupils from her HE perspective. So she was determined to adapt to the changes despite being deeply

affected by the conflict over assessment. Alison agreed with Joan that the politicians requiring the changes were denying the value to pupils of HE as such. In terms of a public curriculum (p.79) of common interests, therefore, there was some doubt here about the right-thinking of those politicians interested in the curriculum. In BS, Sylvia effectively allowed change to happen around her, believing that her personal future was secure in the teaching of sixth-form courses. Sylvia's priorities for allocating BS staff tended to remain with her commitments to Y10 to Y13. Eleanor was resigned to the new circumstances, although feeling that the decision to include BS within D&T was a fairly arbitrary one. She found a particular niche in the coordination of AT5 (Information Technology). Her attitude to change was essentially that, if absorption of BS into D&T was what was now required, she would do her best if someone would give her some guidance. Her eventual transfer to the new staff area is one indication of her self-identification with the technology department.³ Eleanor did not appear as committed to a particular subject as many of the D&T staff, which may well have reflected her previous adaptations to changes in BS. She seems to have been someone who was willing to respond to an empirical-rational or even power-coercive approach, provided she had been given the necessary training. So the opportunity for a re-educative strategy would have been quite significant in her case.

The staff most reluctant to accept the need to change were in CDT. Phil's perception of the national curriculum proposals was that they struck at the heart of the way he operated as a teacher - the way that had been encouraged by the school's first head and had been effective in achieving successful examination results for his pupils. Phil either had to respond positively to D&T or sink into the kind of opposition that typified Len. Whereas Len was within striking distance of early retirement, Phil didn't have that option of getting out. At the beginning of the second year of implementation, when Phil was having to engage with the teaching of D&T, Peter's observation was that Phil was "coming round".

³ The sudden upsurge in interest in BS courses caused by the change in the Y10-11 option system was documented in the case study (p.145). However, when the nature of D&T in KS4 became clear through the publication of GCSE syllabuses, the choice of syllabus caused a complete reversal of fortune. BS teaching as such would simply not be required in Y10 in the 1993-94 school year, as these groups would be working on resistant materials, food, textiles and graphics.

However, as the year progressed, Phil's attitude became increasingly negative as frustration built up over the limited time he could spend with each teaching group and the perceived marginalization of graphics as opposed to the preferred outcomes (in the KS3 SATs) in resistant materials, food and textiles. Phil was very much an individual doing his own thing in the way he had come to believe was expected of him. The culture of the school had not encouraged engagement with some of the wider issues in education, and In-set had not featured highly on Phil's list of priorities. It is at least worth suggesting that here was a case where regular In-set might have prevented the insularity.⁴ From the situation in which he found himself when D&T was proposed, it was extremely difficult for Phil to adapt to the approach that seemed to be required for the teaching of D&T. This inability of Phil to find new meaning within D&T is demonstrative of the problem of enabling teachers to effect change of this nature. Peter's change strategy probably came closest to achieving the desired result, but the school- and national-level strategies did not touch Phil's needs.⁵

An overview of the change process

Figure 8.1 (overleaf) is a representation of the change process from the point of view of the derivation of newly-normative subject meanings. It suggests that the process of achieving D&T norms is possible, but is a long-term one.⁶ Figure 8.1 simplifies the situation (not least because it is an essentially nomothetic perspective), but draws out the main points that have emerged from the fieldwork. On the creation of the D&T curriculum

4 The approach to staff development and change adopted by Peter meant that Peter tried to find ways of overcoming Phil's initial reaction to D&T. Essentially, this consisted of acting as advocate for the cause of D&T if only because it was now what was required.

5 The information from the school at the end of the 1992-93 school year was that Phil had been granted a period of leave to take him up to early retirement on his fiftieth birthday. There were many similarities between Phil and Alison, in terms of their need to understand and be in complete control of their respective teaching situations. Alison survived - progressing to a deputy headship. Phil did not survive in teaching. It is interesting to speculate that at least one significant difference between them that may have contributed to their different fates was that Phil had hardly been engaged in In-set whereas Alison was thoroughly engaged in it.

6 I noted earlier that the school's head expressed the opinion that it would take ten years for the D&T curriculum area to become like the science department, in terms of its level of integration.

area, BS, CDT and HE norms existed in parallel and related to the subject communities of which these departments were a microcosm. Within CDT especially, there were noticeable residual norms from earlier traditions - craft, technical drawing, design - these originating with individuals whose early experience was within these particular traditions. I have suggested through Figure 8.1 that some convergence on a new D&T norm is possible. However, the establishment of a genuine D&T norm depends on the various aspects of the subject - its relationship with activities in the world, its nature in the curriculum, and its pedagogy - being brought within a normative understanding amongst all the staff involved, at least to a level comparable with science. The concern at the moment is that this situation is unlikely to be achieved in schools operating under the 1990 technology Order, and that is the focus of the final hypothesis.

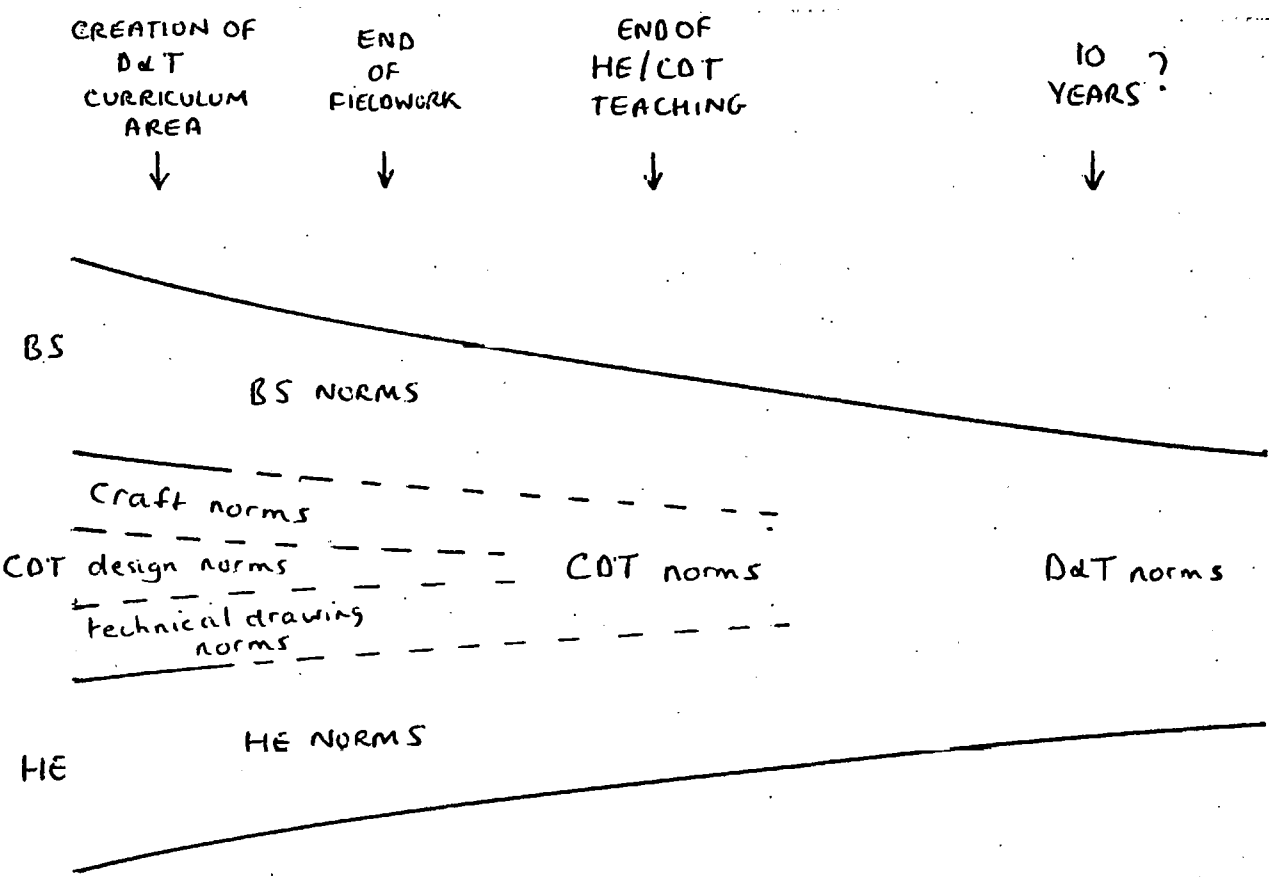


Figure 8.1 Representation of the change process.

It now becomes clearer that a *transitional* department is a department in thoroughgoing change - a change that deeply disturbs all that supports the day-to-day task of subject teaching. The period of transition is, I suggest, one in which pragmatic, expedient and temporary norms have to be developed and used, simply to enable the job of teaching to be done. For example, some form of assessment procedures had to be adopted in the D&T curriculum area because they were perceived as legally required, but these procedures changed almost termly in the first year of implementation, causing much work and a deal of heartache for the staff concerned. A transitional period inevitably results in a pragmatic form of school subject which, to the best of the teachers' ability, seeks to conform to the new requirements as far as they can construct meaning for them. For the benefit of teachers and pupils alike, therefore, it would seem desirable to facilitate teachers' progress through this transitional period by giving them clear guidance and support in constructing the new norms when for some (such as Phil), it will be a difficult personal experience.

The sixth hypothesis is that, unless all the previous hypotheses are taken into account within a change strategy, the change process is likely to be inhibited and may result in outcomes that are less satisfactory than is desired.

The five preceding hypotheses build the thesis which concludes with this final one. The five hypotheses maintained that a range of interest groups exist in the area of technology education, having disparate views about technology in the world, in the curriculum, and its pedagogy. The existence of this range of views has made the definition of technology in the national curriculum difficult and controversial, and its implementation in schools problematic. Also maintained is that the unique characteristics of schools, departments and individual teachers affect the change process in a given situation. A change strategy that ignores these factors, and ignores the effect on the curriculum change process of existing subject meaning structures, will impede the change process and result in unsatisfactory outcomes.

Whilst Uppgrove School had its own particular set of circumstances affecting the change

process, a general perception that emerged from HMI and the NCC in 1992 was that the statutory Order, and the associated strategy of implementation was, indeed, flawed.⁷ I have presented evidence that some thoroughly effective subject teachers had profound problems in coming to terms with the Order, and feeling that help was not available. I have shown that support material was a) late in arriving in schools and b) over-ambitious in its assumptions about teachers being able to answer the questions raised for discussion. Even in different school circumstances, where departments were more used to discussing ideas, this lack of support would have inhibited teachers' ability to respond effectively.

The ultimate consequence of the sixth hypothesis is that it pushes the achievement of a unified D&T norm (as represented in Figure 8.1) further into the future. This has the following two consequences which are of concern. First, it means that the national evaluation and review of 1992, carried out on a tight timetable to conform with governmental wishes for rapid educational reform, was prematurely applied to a situation where there had not been the time to make the necessary changes. This was unsatisfactory for teachers, and set up the conditions for self-fulfilling prophecy in which a particular interest group (the Engineering Council) were able to claim that the outcomes were not what was intended, and were therefore able to take the opportunity of "rescuing" the situation by suggesting modifications in line with their own predilections. Second, it extends the transitional period of uncertainty during which the new norms are unclear and so the old ones remain as useful supports. This is unsatisfactory for pupils and stressful for teachers. It extends the period of time during which pupils are experiencing learning activities that are, to an extent, pragmatically selected and designed.⁸

7 Regarding change strategy, the HMI report (DES/WO, 1992, p.9) noted lack of time for teachers to plan and in-set "modest in amount and mainly of an introductory nature". It also noted the reduction in the number of advisory teachers and closure of technology in-set centres.

8 The current (1993) wholesale review of the national curriculum has further delayed the implementation of a revised form of D&T. Rather than give time to allow for a more considered implementation, this delay may, ironically, lead to further disintegration and certainly will not encourage the development of meaning.

The time period that is indicated in Figure 8.1 suggests that Fullan's model of outcomes of intended changes (Figure 3.1, p.93) has to be applied with caution. However, for the pupils who started in Y7 in Upgrove School in September 1990, what they experienced in that year *was* the outcome. Also, the longer the period of transition, the more pupils experience pragmatically-constructed outcomes. In terms of Fullan's model of outcomes, therefore, the real possibility emerges of a type III implementation - "a change that is not technically well developed ... is being put into practice" (Fullan, 1991, p.18). In the case of D&T something *had* to be put into practice because of the coercive nature of the implementation strategy. In the absence of any clearer guidance, the teachers in Upgrove School responded by trying to re-package what they valued from their existing subjects within D&T, but that re-packaging is not the same thing as constructing overall meaning for a new subject that has a rationale and practice of its own.

There is no reason to believe that the pupils being taught D&T in Upgrove School had a better or worse deal than those in any other school. An I.e.a. inspection team and a visiting HMI gave the department a clean bill of health, and my own comparison with other schools was that the outcomes of pupils' work were comparable.⁹ However, the evidence presented in support of the various hypotheses suggests the need for a more appropriate approach to implementing D&T, as follows:

- The national strategy needs to allow the controversies between interest groups to be worked out more thoroughly, rather than over-ridden by working group or National Curriculum Council. A subject as complex as technology cannot be created in such a short timescale, and by such a restricted process, if a meaningful rationale is to be developed that includes views of technology in the world and the curriculum, and its pedagogy.
- The national strategy needs to recognize the deep grounding of teachers in the meaning structures of their subject communities, and provide a

⁹ My own work as a provider of in-set for teachers of D&T gave me access to many other teachers and schools during the period of the fieldwork.

mechanism whereby re-educative procedures operate effectively at departmental and individual levels.

- Strategies at school and departmental levels need to recognize the degree of shift required of teachers, and the degree of micro-political activity between departments. In part, this is a job which is the responsibility of senior management teams, and for which they need better training.
- Strategies at all levels need to value individual teachers and recognize that the changes at school level need time, even if the prerequisite negotiation over a rationale has been effectively carried out at national level.

8.3 Conclusions about the nature of D&T as a school subject

D&T as specified in the 1990 technology Order is entering the curriculum of all pupils. The cohort of pupils entering Y7 in 1990 will be the first to follow this subject through the secondary phase and to take GCSE examinations in it in summer 1995. The school year 1994-95 will for the first time see all secondary pupils simultaneously experiencing D&T. The question as to what these pupils are experiencing is, therefore, an important one. This question therefore requires a final reflection on the rationale for this subject in terms of its relationship with activities in the world, its nature in the curriculum, and its pedagogy.

The 1990 Order selected particular aspects of technology, based around designing and making products (DES/WO, 1989, p.86). Design and technology was seen as a field of knowledge which draws on a range of knowledge and skills in completing practical tasks (DES/WO, 1989, pp.10-11). This underpinning rationale was rehearsed in the published documentation leading up to the statutory Order, but became submerged under the layers of statutory programmes of study and statements of attainment (Hunter, 1993). In choosing the design-and-make focus, a whole range of other aspects of technological capability were missed out (not least those enumerated in the working group's interim report (DES/WO, 1989, pp.17-18)¹⁰), but that is inevitably the case when what is included in a school subject

¹⁰ Capability there being able to 'use ... make critical appraisals of the personal, social, economic and environmental implications of ... improve, and extend the uses of ... design make and appraise ... diagnose and rectify faults in artefacts and

is selected from many possible activities in the world. Reservations have been expressed (e.g. as noted on pp. 64-69), and continue to be expressed (e.g. The Engineering Council, 1992), both about the selection that was made and the way in which the selected activities were presented. That is inevitable when a wide range of groups have an interest in the same area of the curriculum. My concern here is not for that larger argument, but more that what is intended shall be able to demonstrate a clear rationale and be educationally sound in terms of pedagogic encounters.¹¹

It is central to my thesis that changing the curriculum strikes at the heart of existing successful pedagogic encounters. This in itself contributes to conservative reactions by teachers when they are required to change what they are teaching. But the converse is also significant - that a new curriculum is only effectively implemented when it results in new successful pedagogic encounters. Although the fieldwork for this thesis focused on teachers' response to curriculum change, sufficient data were obtained about outcomes to enable some retro-analysis of field data when it became apparent that this may link with new research on pupils' problem-solving in D&T being carried out by Hennessy, McCormick and Murphy (e.g. 1993). It must be stated, therefore, that this final section consists of speculative suggestions based on data that were not primarily intended to shed light on the pedagogic process.¹² The suggestions relate to the influence of external assessment on classroom pedagogy, the nature of pupils' problem solving in D&T, and the combination of these two factors that brings about outcomes that do not necessarily represent the desired development of capability.

systems' (see p. 59 of this thesis).

¹¹ For comparison, I showed on pp. 20-22 how there is considerable philosophical debate about the nature of science, and debate about its nature in the curriculum and about its pedagogy. Sustained debate, informed by research into pedagogy, is needed if D&T is to achieve anything like the status and value of science in the curriculum.

¹² It is appropriate to acknowledge at this point that the fieldwork from which this thesis has drawn its evidence did not focus on establishing the nature of successful pedagogic encounters in D&T. The fieldwork focused on the change process as partly evidenced by teaching *intentions* rather than outcomes. However, it was inevitable that some attention was paid to outcomes because it gave clues as to what teachers valued - and hence to how they responded to having to teach something different as required by others having different values.

Asking any question about successful pedagogic encounters begs an underlying one about what comprises such an encounter, and in the case of D&T returns the discussion to the consequences of the existence of various interest groups having a range of views about appropriate pedagogies. The teachers in Upgrove School evaluated pedagogic encounters within their subject-normative meaning structures along several dimensions:¹³

- progressive development of skills, and the associated pupil satisfaction;
- pupil success in public examinations;
- the sense of feeling that pupils had been well-prepared for aspects of entry to adult life, or higher education, or a career;
- the feeling that pupils had enjoyed what they were doing, because enjoyment meant receptivity and consequent learning (a relatively short term dimension).

Ultimately, all teachers were concerned with the evaluation of their pedagogy represented by externally-applied tests and examinations. There is no doubt that the normative pedagogies in BS, CDT and HE throughout KS3 and KS4 derived considerably from those implicit or explicit within the relevant GCSE syllabus documents. Whatever was assessed (skills in BS, processes as well as skills in HE and CDT) became the focus of pupils' activity.

In the first two years of D&T implementation the only guidance about assessment came through the statements of attainment in the 1990 Order. The case study showed how significant the perceived requirements for statutory assessment became in the conflict between CDT and HE. The importance of *external* assessment procedures in determining pedagogy is seen in the teachers' attitudes to a) the Standard Assessment Tasks (SATs) at the end of Y9, and b) the nature of the GCSE courses available in KS4. Information about

¹³ In line with the previously-stated caveat, these dimensions are not exhaustive, but are those that most frequently occurred during the fieldwork in conversations and interviews with the staff.

these began to emerge at a late stage in the fieldwork, but it was apparent that these were seen as definitive indications of the nature of D&T to a greater extent than any other information (Chapter 7, p. 265).

This attention to external assessment leads me to suggest that D&T is in the process of becoming an internally-defined functional school subject only serving its own testing procedures - omitting to clarify connections with activities in the wider world or to establish a clear rationale for itself in the curriculum. If that is the case, then the very least to be hoped for is that pedagogic encounters will be genuine within the terms that the subject sets out for itself - in this case the development of a process-based capability in the area of designing and making. Unfortunately, it is in exactly this area that the early evidence from the research of Hennessy, McCormick and Murphy (1993) is disturbing. They draw attention to problems perceived with the concept of a general problem-solving capability (the development of which they point out is claimed as one of the desirable features of D&T), by drawing attention to the concept of situated cognition. This latter suggests that most learning is highly context-specific (Lave, 1988). McCormick, Hennessy and Murphy (1993) further point out that research in the situated cognition tradition:

serves to highlight a considerable number of differences between problem solving in and out of school (Hennessy, 1993). Of particular relevance ... is the fact that everyday problems are authentic and relevant to the learner, rather than artificially constructed like typical classroom activities in technology, such as "design and make" tasks ... experience indicates that such aspects of everyday culture cannot be so readily transposed to the artificial and constrained environment of the classroom.

[...]

Research on classroom learning in complex domains such as mathematics and science repeatedly shows that conventional teaching impedes the development of understanding by emphasising formal procedures and devaluing children's existing knowledge and experience. An outcome of this de-valuing and of the difference between problem solving inside and outside the classroom, is that there are frequent mismatches between *actual*

learning experiences and outcomes, and teacher-intended ones. For example, children are known to construct and adhere to their own alternative conceptions of science, and to invent reliable, intuitive methods of mathematical calculation. They ignore conventional teaching in these domains, whilst presenting a "veneer of accomplishment" (Lave, Smith and Butler, 1988). (McCormick, Hennessy and Murphy, 1993, pp. 2-3)

Such a "veneer of accomplishment" may be nothing new in the world of education. Some debate in the science area has focused on pupils moving through a sequence of steps that purports to be "process science" but in fact is a series of educational hoops. Thus, for example, the classical way for pupils to present the results of an experiment was under a series of headings "apparatus, method, results, conclusions". It was, perhaps, as important for the writing-up to be completed (and the results cooked or borrowed if necessary) as it was for any genuine scientific learning to take place. Nuffield science was, of course, supposed to address such issues. However, in an article entitled "What's supposed to happen, Sir?" (Wellington, 1981), a teacher drew attention to the failure of even the enlightened Nuffield approach to get pupils learning to do science, instead of feeling they had to arrive at a "correct" answer.

Turning to the D&T area, it would be naive to suggest that this kind of getting of pupils through the necessary hoops did not occur. For example, the strong use made of the stages in the "design process" by some teachers in Uppgrove School (before D&T arrived) was open to such a criticism when it was applied too unthinkingly. However, it is tempting to suggest that, for example, the apprentice-style pedagogy of Len the woodworker, who was certain of the nature of what he was teaching and why within woodwork, and knew how to develop appropriate skills in his "lads", was of sounder educational value than some of what has gone on under the guise of D&T. From that point of view, one of the satisfying features of the response of the teachers in Uppgrove School was their determination to hang on to pupil activities which they felt to be educationally valuable, in the face of pressure to change to something with an unproven pedigree.

D&T in the national curriculum has focused on the development of design-and-make

capability at the expense of other curricular aims. In its interim report the D&T working group noted:

We emphasise the provisional nature of our thinking on some issues which are complex and under-researched, as well as the fact that design and technology lacks a school curriculum tradition comparable to that of core and other foundation subjects ... design and technology lacks a research base in pupils' understanding and learning such as is available in the cases of mathematics and science (DES/WO, 1989, pp.6-7).

It has to be of concern that a subject now experienced by the whole school population starts from such a low level of understanding of its nature and pedagogy. Teachers alone cannot construct this, but have had very little help in so doing, with the consequence that they do the best they can from their existing experience. But, as I have argued, that is ~~experience of other related but different subjects.~~ Doubtless there will eventually be a revised version of D&T. What seems even more certain is that a revised version will incorporate as little grounded pedagogy as the first. The question is, therefore, will it be of any more educational value than the version it replaces?

Methodological Appendix: the research process in this case study

The Case Study approach

The case study approach is a particular *genre* of research whose educational applications have been much debated (for example, I noted in Chapter 1 articles by Walker, 1983 and Kenny and Grotelueschen, 1984). Other writers (e.g. Taylor, 1979; Burgess, 1984) have drawn attention to the importance of case study work since the mid 1960s because of its ability to expose and explain interactions and mechanisms in a way that less intensive methods (such as widely-distributed surveys) cannot.¹ I use the term "case study" in the sense of an "intensive investigation of [a] single case" (Kenny and Grotelueschen, 1984, p.37). The term used in this way does not, therefore, imply a particular method of gathering data (through an experimental, survey or ethnographic approach). In this case, however, the approach was ethnographic, in that data were obtained through fieldwork carried out in a school that was engaged in its everyday work (albeit that this work included responding to the changes required by the national curriculum). The ethnographic approach requires the researcher to be present in some kind of participant-observer mode.² Such a mode can vary from highly- to negligibly-participant. In this case I was, overall, minimally participant, except that in the initial phase of fieldwork I participated as a teacher in some shared lessons alongside one member of staff.³ The strength of the ethnographic case study approach is that it makes possible a detailed study of one situation that maximizes the chance of explanation.⁴ The weakness is that the single case may be idiosyncratic and of limited general value. The internal validity of the case study

1 For a general discussion of social and educational research methods see, for example, Bynner and Stribley, 1978; Wilson, 1978; Open University, 1979a.

2 For a thorough discussion of participant observation, see McCall and Simmons (1969).

3 My possession of qualified teacher status in a related subject (physics) made this possible. My sharing in teaching with Tony, when he was a newly-qualified teacher, was seen in the school as a potentially beneficial activity.

4 I noted in the thesis some of the classical examples of ethnographic case study work in schools: Hargreaves, 1967; Lacey, 1970; Ball, 1981. For other examples of such work at the levels of schools, classrooms and teachers see Burgess, 1984 and 1985; Hargreaves & Woods, 1984.

(reasonable certainty that the explanation offered is the correct one) and its external validity (its relevance to other cases) need to be addressed through the methods adopted.⁵ To ensure validity, particular care needs taking over the effect of the presence of the observer in the field, and the interpretation of data. Issues of internal and external validity in this case are both dealt with in this appendix.

Atkinson (1979) draws on Strauss *et al* (1963) in identifying three broad phases in ethnographic fieldwork:

(a) *The initial phase* Guided by broadly defined research interests, the fieldworker collects data with a view to trying out a wide range of possible ideas and lines of inquiry.

(b) *The second phase* Significant classes of persons and events begin to emerge. Initial research problems may have undergone reformulation, and ideas start to come into focus. Working hypotheses and propositions are formulated with reference to specific aspects of the field of study.

(c) *The third phase* The testing of a restricted number of hypotheses is undertaken.

Atkinson (1979, p.52)

This makes it apparent that, in this form of research, hypotheses (such as the six used in this thesis) emerge from the fieldwork.⁶ Inherent in the progress of fieldwork through the three phases is the idea of *progressive focusing* (Atkinson, 1979, p.53). Through this process, early fieldwork involves the collection of as much potentially useful data as possible, whereas later fieldwork can focus on particular areas of data as hypotheses are formulated, tested and clarified. An example of this process in this case will be given.

⁵ For a discussion of internal and external validity see Open University, 1979b; Campbell, 1969. For a concise yet thorough discussion of the issues involved in setting up ethnographic fieldwork see Atkinson, 1979. For an approach to analysing the data obtained, see Hammersley, 1979.

⁶ Ethnographic work of this kind is essentially of an *inductive*, rather than a *hypothetico-deductive* nature. Atkinson (1979) discusses the nature of hypothesis formulation and testing and also suggests Wiseman (1974) as an example of the interplay between data and analysis in ethnographic research.

Data collection and analysis

The presenting situation

A unique research opportunity presented itself when it became apparent that a major change was going to be required of the teachers charged with implementing national curriculum D&T. Although the arrangements for monitoring the implementation of the national curriculum included the inspection of schools, the level of understanding of the change process that I was seeking suggested the need to focus attention on a detailed study of one school. My own research interest in finding out why teachers responded in particular ways to the requirement to change was, in any case, different from that of governmental inspectors, who would be looking more at curricular outcomes.

The selection of a school

Although no state-maintained school would be missing out on the change process, the need to become rapidly committed to a single school as the major research setting included an element of risk. Any school would have its unique circumstances at the time the change requirement became effective, and any setting for the research would, therefore, need analyzing for what was generalizable and what was quite specific to that one situation. A key criterion in selecting the school was, therefore, that the school should not exhibit any feature so idiosyncratic as to minimize the possibility of generalization. Apart from that key criterion, three practical criteria were used in the initial selection of the school:

- i) it should be a reasonably large, mixed, state maintained comprehensive;
- ii) it should be within reasonable travelling distance of my home;
- iii) the staff would have to tolerate a researcher for a long time period.

The first of these was intended to ensure that all subject areas contributing to the national curriculum in general and D&T in particular would already exist in the school, and the

issue of cooperating in presenting the new subject to all girls and boys would have to be addressed. The second criterion addressed the practicality of my own available time, especially if visits were to be made over several years, and if some of these were to be quite short (e.g. to observe one lesson or attend a meeting). The third criterion is an obvious requirement to enable research to take place, but presented the need for a sensitive approach at a time when teachers were feeling increasingly resentful of imposed change upon change, and some (e.g. HE teachers) were feeling quite vulnerable in terms of their subject's continuing presence in the curriculum.

Uprove School met the first two criteria, and initial meetings in May 1989 confirmed that the third criterion was likely to be met. Initial contact with Uprove School was by letter to the head, through whom I subsequently sent to the heads of CDT, Home Economics and Science copies of a letter about my proposed project investigating the implementation of national curriculum D&T. From the beginning, I stated a two-fold purpose for being in the school. To the head in the first instance I stated an interest in having a "friendly" school where I could drop in on an occasional basis simply to keep in touch with developments in D&T in order to ground my own work of developing in-service material for teachers, as well as an interest in researching the change process.⁷ The head was amenable on both accounts. With everyone else I initially emphasized the first, whilst not denying the second. My basic line with the staff was that I needed to keep in touch with the developing situation in D&T to enable me to continue being an effective teacher trainer. Such a line effectively covered both requirements, for a teacher trainer needs to understand the change process as much as what the change requirement is. However, from the beginning, I was aware of the need to develop some kind of research bargain⁸ if I was going to obtain the kind of access for the kind of time period I had in mind - three years at the least.

⁷ When the fieldwork started, I had been engaged for three years in the production of in-service material for teachers of technology.

⁸ The idea of a research bargain being that, in exchange for the access, the school would find something of benefit from my presence.

The first visit to the school was to meet the head and also the heads of science, Craft Design and Technology (CDT), and Home Economics (HE). At this stage, the need for a multiple entry into the school was apparent, because of the emerging DES/WO statements about who would be teaching D&T, and there was also a need to discover what, if any, involvement this school's science department had in the teaching of technology.

Selection of departments and staff

At the first visit it became clear that the science department was concentrating entirely on the implementation of its own national curriculum (the science Order being available before the technology Order) and that the new "D&T Curriculum Area" had just been created out of the existing Business Studies (BS), CDT and HE departments. All the staff of these three departments were, therefore, likely implementers of D&T. At the first visit I arranged a second meeting with the head of CDT, because it emerged that he had just been given the post of convenor of the new D&T curriculum area. At that second visit I negotiated with him the initial period of fieldwork. He agreed to let me visit regularly on Friday mornings during the October-November half term of 1989 in order to spend time in the lessons of various staff, so that we could all get to know each other and I could begin to get a picture of how the existing subjects were taught in the school. No significant obstacles were apparent in these initial encounters, although it was clear that the head and the head of CDT were interested in obtaining some kind of evaluation of their implementation of D&T as a result of my presence. The nature of a possible research bargain was, therefore, raised at this early stage. I pointed out that overall evaluation was not something I could attempt, and this was accepted. In the first instance I offered the possibility of teaching alongside Tony, and this was felt to be acceptable.⁹

The nature of the bargain in this case will be presented in this appendix.

⁹ In entering into a research bargain, I was careful not to compromise my own research agenda. Sharing in some teaching with Tony was possible because, as a former physics teacher, I had expertise in electronics which happened to be what Tony would be teaching. His own expertise in electronics was limited, so, from the school's point of view, this was a piece of useful in-set. My sharing in lessons in this way at this stage had insignificant impact on the overall process of change in the school.

The first action that I took subsequent to these initial meetings was to attend a curriculum area meeting to outline my wishes to the rest of the D&T staff. Again, at that meeting, no significant barriers were put in the way. At no stage in these initial encounters did any feature emerge that suggested that the school would not produce generalizable conclusions. The key criterion appeared to have been met. The departments contributing to D&T included staff who were representative of many of the interest groups involved in D&T implementation. The range of staff went from enthusiasts rooted in existing subject meanings and therefore needing to take on a broader view, through willing teachers who would need to learn new things in order to continue teaching effectively, to outright antagonists who wanted none of it. All the subjects potentially contributing to D&T appeared well established and conscientiously taught in the school, which meant that each department had something significant to offer, but also something to lose from what was being taught.

Beyond the head, there turned out to be three key gatekeepers - the heads of the three participating departments (BS, CDT, HE). It was obvious from the beginning that the three territories were separate and needed separate negotiations for access. Then, beyond that, there was the need to negotiate with individual teachers for access to each class and classroom that I wanted to enter. I had to repeat to every individual the story of who I was and why I wanted access.¹⁰

The fieldwork

Table A.1 (overleaf) shows the pattern of the fieldwork, which extended from May 1989 to December 1992. This included times of relatively frequent attendance at the school (twice a week) and times of occasional visits. Figure A.1 shows the proportion of total *time* spent in the different stages of the fieldwork.

¹⁰ Some teachers accepted my story at face value and never asked me again. Several sought clarification at the outset of the first formal interview. One spent the entire three years suggesting that I had an ulterior motive as an undercover inspector.

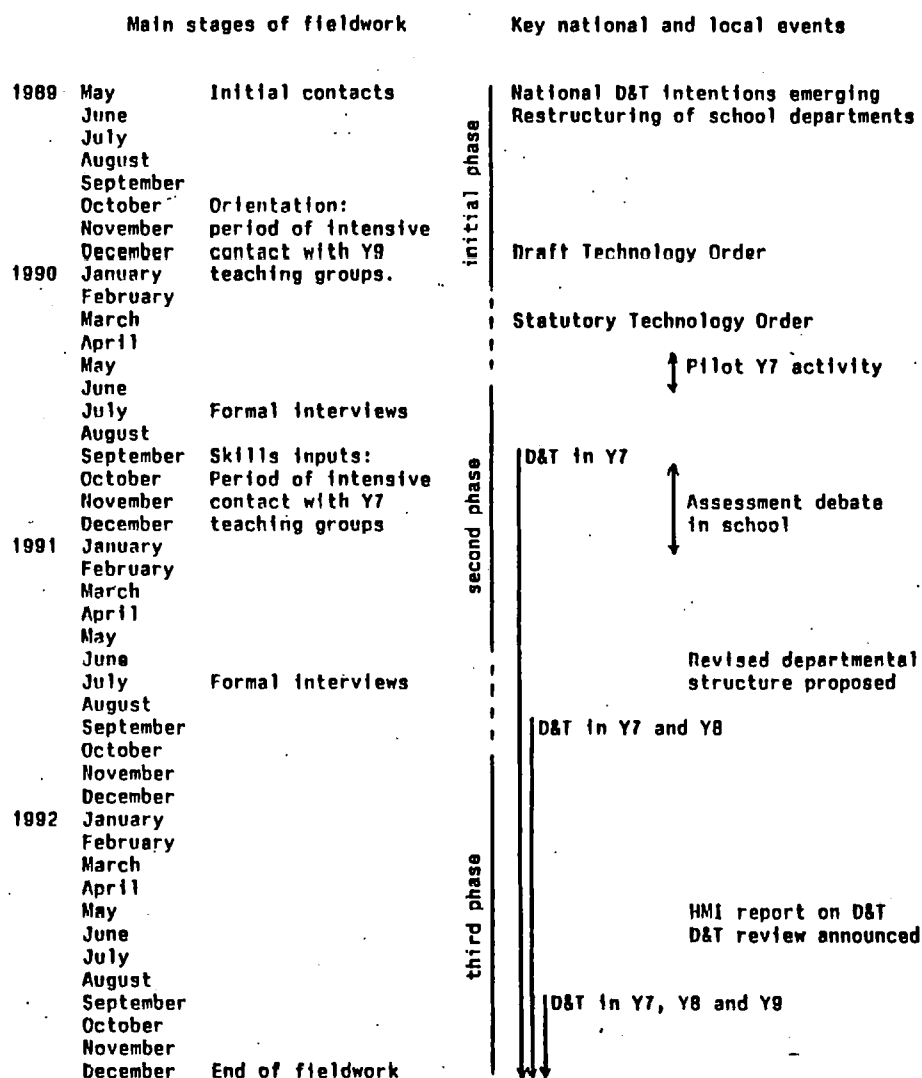


Table A.1 The pattern of the fieldwork

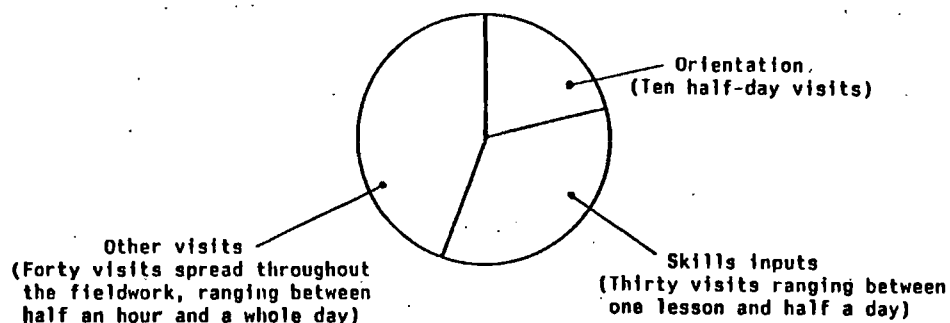


Figure A.1 Proportions of time spent in different stages of fieldwork.

In all, eighty visits were made to the school. The intensive periods of fieldwork were firstly at the time when I was familiarizing myself with the school, departments and staff (Orientation - ten half-day visits from October to December 1989) and secondly in the first months of D&T implementation (Skills inputs - thirty visits September 1990 to January 1991). It was impossible in May 1989 to have any long-term view of how contact with the school would develop. After the initial period of intensive contact, my visits to the school tended to follow a pattern set by significant developments. Thus, for example, when the Y7 pilot scheme was being run in the summer term of 1990, I visited the school more frequently. Decisions had also to be made about how to use each visit, or series of visits. For example, in the intensive fieldwork at the beginning of D&T implementation (skills inputs, September 1990 to January 1991), I had to decide whether to sample lessons across the departments or to follow a group of pupils round the skills circus. I chose the latter because it would provide a logical means of gaining access to each teacher (in one half year) and enable me systematically to analyze the activities. A disadvantage was that I would see one teacher's first attempt at one activity and other teachers' subsequent attempts. Therefore, I also revisited most of the activities to establish if any adaptation was taking place. Classroom observation represented a significant proportion of time spent in the school: at least three-quarters of visits included at least one spell of such observation. In the early part of the fieldwork, this allowed me to gain familiarity with teachers, and allowed me to gather data about how they talked about and presented their own subject to their pupils. Later in the fieldwork, it gave me the opportunity to observe and discuss particular points about the implementation of D&T, such as the place of skills and the use of themes.

The three phases identified by Atkinson (1979) are also indicated in Table A.1. The transition from the initial phase to the second phase occurred after the first intensive period of fieldwork. By this time - before the first formal interviews - it was becoming clear who were the most significant people in the change process and what were the most significant

issues affecting the change.¹¹ However, a *caveat* to that generalization is the point made in the thesis that different issues emerged as D&T progressed up the school. There is little doubt that many of the central issues in the change process emerged in the debate over assessment procedures in the school year 1990-91. The transition from the second to the third phase was taking place at the end of the 1990-91 school year, when the interviews were more focused on emerging issues. In the remaining period of fieldwork, the focus was on the confirming of the emerging hypotheses.

Formal, taped interviews with staff were mainly held in clusters in July 1990 and July 1991, although some key individuals were interviewed at other times (see Table A.2 overleaf). The interview schedule in Table A.3 (p.312) is typical of that used in the first batch of interviews. Questions are either to obtain factual information or are open-ended to provoke relatively spontaneous reflection. In subsequent interviews, the questions were more closely focused on verifying an individual's perspective on a particular issue.

As regards day-to-day interactions, I changed my tactics over the period of the study. As the staff and I got to know each other and got over the initial concerns, I began on occasions to apply the "devil's advocate" approach to see what response it would evoke. For example, during one breaktime a member of another department popped her head round the door of the CDT staffroom to see if someone she needed to contact was there. There was some banter about the activities of a forthcoming training day, which provoked the comment from the visitor that her department was engaging in "team building" activities because they had a new member of staff. This provoked a reaction from CDT that "When we formed our department we didn't need team-building activities!". Now, of course, this was a revealing interaction in its own right. But I took the opportunity subsequently to press the question as to whether or not the CDT teachers were a team.

¹¹ It was going to be necessary to retain contact with all members of the new D&T curriculum area, and with the head. I had realised that meetings with the first head (now retired) would also be productive in providing an understanding of the nature of the school and its response to change. It had also become clear that the three existing deputy heads would not be closely involved in the change process, and would be unlikely to be included in formal interviewing.

"You're a team, aren't you?" was my question, choosing to take a stance that sided with the CDT view rather than the view that recognized the need for team building. This provoked a useful reflection that I was able to build into my understanding of the working of the CDT department.

Table A.2 Timetable of interviews with staff.

Taped interviews: length between 30 and 90 minutes.

Peter	3 JUL 90	10 DEC 90	27 JUN 91	
Tom	5 JUL 90		4 JUL 91	
Phil	4 JUL 90			
Len	3 JUL 90			20 JUL 92
Tony	3 JUL 90		4 JUL 91	
Sylvia		14 JAN 91	27 JUN 91	8 JUL 92
Eleanor			10 JUL 91	
Joan	6 JUL 90		11 JUL 91	
Alison	6 JUL 90	23 NOV 90	11 JUL 91	
Jenny	4 JUL 90			
Sharon				20 JUL 92

Noted interviews with the head: typical length 30 minutes

MAY 89 OCT 89 2 JUL 90 10 JAN 91 8 JUL 91 18 MAR, 15 JUL 92

Also five taped interviews lasting approximately one hour each were conducted with the first head in the period December 1990 to March 1992.

Notes.

In some instances, practical constraints meant that I did not press an individual to carry out a taped interview if the circumstances were difficult. Where the table shows the absence of a taped interview, I was confident that conversations had given me sufficient information for the purposes at the time.

My first interview with the head happened spontaneously, when I was only able to make notes. This method worked well in this case, with conversation flowing freely. I decided not to use a tape recorder when interviewing him.

Table A.3 Typical interview schedule for first formal interview.

How long have you been on the staff here?

When did you become a teacher?

Any particular reason why?

Have you worked in other jobs?

Were you appointed to your present post here, or have you had different jobs in the school?

Where did you train?

What subject were you trained to teach?

What changes have you seen in your own subject area?

What place does the subject you now teach have in the curriculum of this school?

Have you been following the developments in national curriculum technology?

What do you think will be the consequences for you?

What do you think will be the consequences for your subject?

What is your main concern about the national curriculum?

What is the main advantage that the national curriculum offers to you?

What effect has the creation of the D&T curriculum area had on you?

Has the school changed generally since the arrival of the new head?

Is there anything you want to ask me about what I'm doing here?

The research bargain

I have already indicated an initial aspect of this - teaching alongside Tony. Throughout the fieldwork I resisted all requests for an overall evaluation. As it happened, the school had visits from l.e.a. and national inspectors during the fieldwork, and this resulted in evaluative responses from the inspectors.¹² In the final phase of fieldwork I did submit a draft of a paper on the change process to the head of technology. This provoked some useful comments in return, and also the observation that it rang true (thus helping my verification of data and its interpretation).

Very often, after classroom observation, I would reflect on aspects of the lesson with the teacher. Such relatively unobtrusive reflections were often commented on as useful. On one occasion (noted in the thesis) I was asked to observe a lesson for a particular reason for the teacher concerned. I felt able to do this because it did not intrude on my own research agenda. Following my shadowing of a group of pupils round the first skills input circus, I presented an analysis of the activities against the technology attainment targets to the D&T staff. This certainly highlighted the difference between the contributions between, on the one hand CDT and HE (in the area of ATs 1-4), and on the other hand BS (AT5), but that difference was already becoming apparent to the staff.

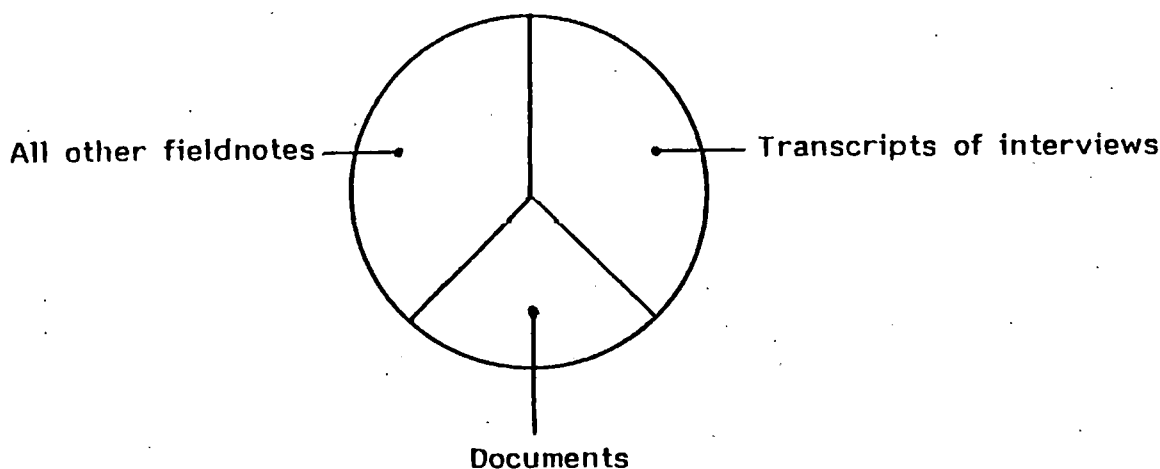
An often-repeated perceived benefit of my presence was that the formal interviews gave people the opportunity for reflection that they would not have otherwise taken. Inevitably, the asking of questions about a situation (especially more directed questions in later fieldwork) provokes the interviewee to thought. Towards the end of the fieldwork, I specifically asked several staff if they thought that my presence had affected the change process in any way. The view was that it had not done, but that it had sometimes been valuable to have a neutral person to talk to.

¹² I once asked a member of staff how an inspector's interview questions compared with mine. The response, "Yours are cleverer!", led to a discussion that indicated that I was developing a correct understanding of the situation.

The database

The fieldwork generated a database of considerable size and of three main kinds, whose proportions of the whole are indicated in Figure A.2. (below)

Figure A.2 Proportions of data in database.



The initial batch of taped interviews was transcribed in full to allow easy searching of their contents within a range of categories. Subsequent taped interviews were not necessarily transcribed in full. Some interviews consisted of highly focused answers to questions, whereas others were more generally conversational - depending largely on the interviewee's natural style of response. The time involved in transcribing meant that, for later interviews, it was better to make notes, rather than full transcripts, and then go back to the tape for particular quotations. Any interviews not tape recorded were written up in full on the same day.

Other fieldnotes comprise notes taken in all circumstances of visits (classroom observation, meetings, sitting in staffrooms, passing conversations), written at the time or immediately after the event. Documents include pupil worksheets, syllabuses, planning and assessment documents, other relevant school and l.e.a. documents.

Use of the database and generation of hypotheses

The database grew as the fieldwork progressed and was usefully segmented not just by type (interview transcript, fieldnotes, documents), but by school year. The ideas that interest groups would be active, and that the kind of change strategy employed would affect the change process, were around from the beginning of the fieldwork, so loose initial categories of data were set up around these ideas. Thus, attitudes to change and meanings within subject areas were sought from early data. I was concerned initially to be able to sort out responses to D&T requirements *as such* from responses to the general changes instituted by the new head. Therefore, I particularly identified comments made about the new regime. As the fieldwork progressed and hypotheses formed more clearly, subject meaning structures were made a particular focus of attention. For example, much use was made of the phrase "the design process". A brief description of how this category of subject meaning was established will serve as an example of progressive focusing.

In the initial stages of fieldwork, I noted all instances where reference to the design process occurred. This included displayed posters, blackboard instructions, verbal instructions to pupils. In conversations I simply took teachers' uses of the phrase at face value, not wishing to provoke debate on the subject. As time progressed, I actively sought out any information in use in the curriculum area about design (such as syllabuses and books), to see what was included about the process. I focused down on the issue around the time of the second formal interview with most people - asking what they meant by "the design process", how it fitted in with technology, and how it matched with national curriculum D&T.

Reflection on issues of validity

The long contact with the one school provided considerable opportunity for data triangulation of various kinds, giving me confidence in my explanations (for example, confirmations of the same event by different people, or confirmations between passing remarks and formal responses by the same individual, or agreement between documentary

and verbal evidence). I have already noted that, towards the end of the fieldwork, I presented a written summary of some of my findings to the head of D&T who responded from his own perspective. I also became increasingly reflective in conversations with staff towards the end of the fieldwork.

One potential disadvantage of the periods of intermittent fieldwork (between the intensive periods) was that it was possible to miss a significant event. However, I became sufficiently confident of my relationships to be able to ask if anything important had happened and I was able to "catch up" with developments on occasions. In any case, events that were of significance in the change process were talked about, and their repercussions felt, for more than a few days. I am certain that sometimes it was better *not* to have been present when a significant event happened, because I could then be sure that my presence had not disturbed that immediate event. Reconstructing the event from conversations with a range of people then provided the opportunity to discover from these various perspectives, not only why *that event* had been significant to them, but also how their response to the event shed light on their own meaning structure.

In terms of finding common issues with other schools - the question of external validity - I took various opportunities to test out my findings against other groups of teachers and l.e.a. advisory staff, to see if my own findings were in any way typical or representative of what was going on nationally.¹³ Again, I am sufficiently confident that the issues and explanations are of general application and interest. I noted in the thesis various confirmations of my specific findings resulting from l.e.a. and national surveys of D&T implementation. A case study and a more general survey can thus be mutually confirmatory - demonstrating the value of the use of a range of research methods in investigating the same question. The case study suggests reasons for more broadly-observed phenomena.

¹³ In my work as an In-set provider, I had regular opportunities to talk with staff from l.e.a.'s throughout the country.

Throughout the fieldwork I tried to be sensitive to the routine of the school year, for example holding formal interviews after external examinations but before the very last week of term. I believe that this flexible approach to fieldwork paid off in terms of minimizing the impact of my work on individual staff and making possible a professional dialogue about aspects of curriculum implementation as part of a research bargain. Inevitably, my presence in the school, and my questioning of people about the change process, did affect that process. However, I am convinced that the forces that were at work within the school were far more powerful than any influence that my presence in, or interrogation of, the situation might have exerted.

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